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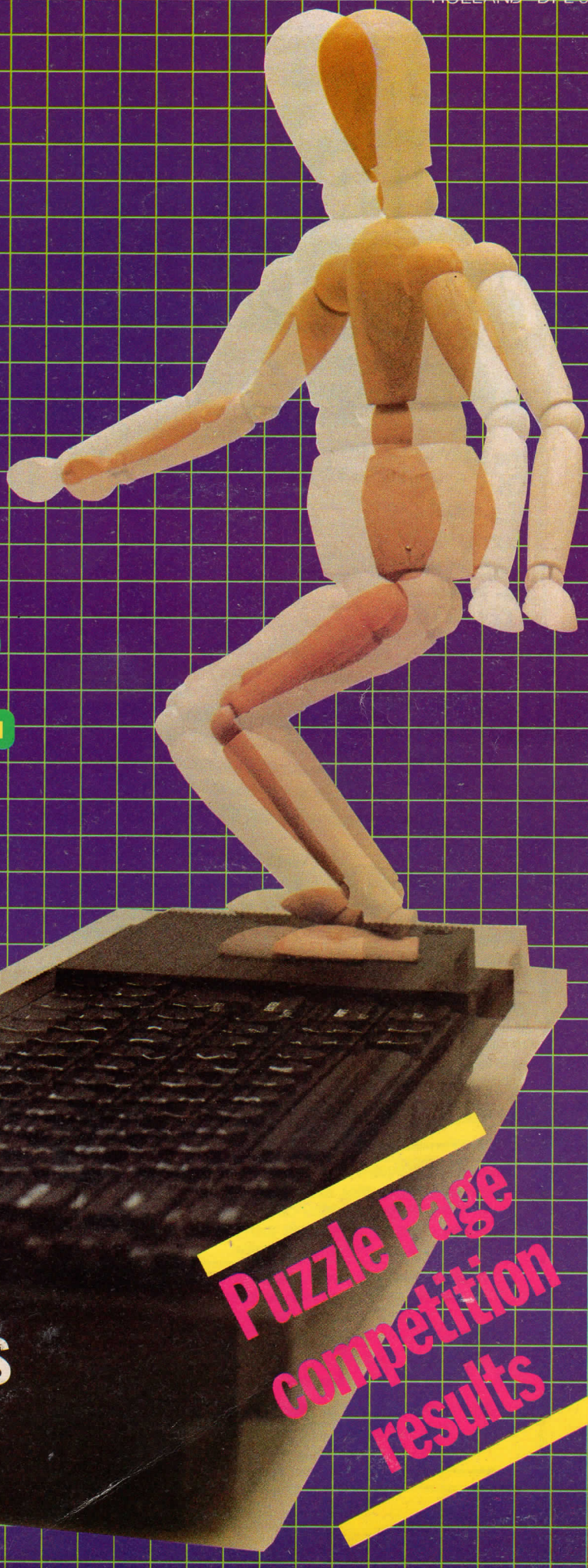

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Published by Focus Investments, London

Distributed by Quadrant Publishing Services, Sutton.

Subscription information from: Quadrant Subscription Services, Oakfield House, Perrymount Road, Haywards Heath, West Sussex 0444 459188 (£15 UK, £30 Europe, £45 Rest of the world).

Typesetting and Make-up by Time Graphics (Northampton) Ltd.

Printing by Cradley Print, England.

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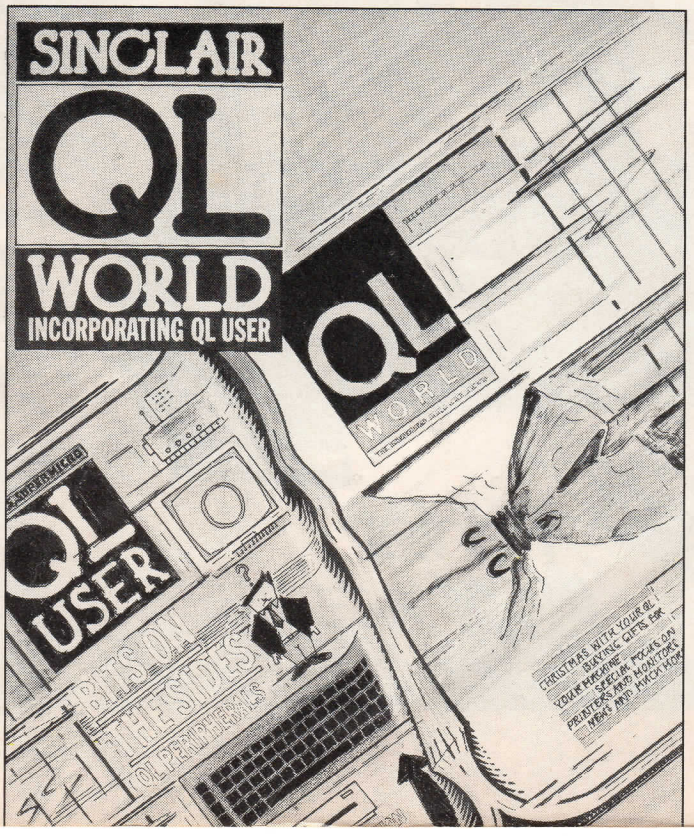

NEXT MONTH

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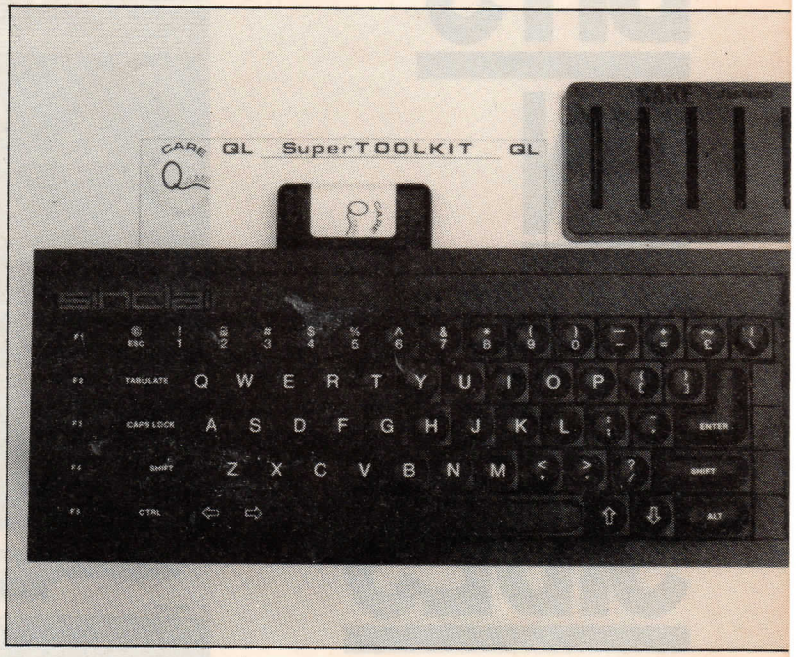
QL SCENE

Super Toolkit

The new Super Toolkit from Care Electronics. The 16K EPROM cartridge is accompanied by a comprehensive user manual and a 'library rack' — a handy piece of plastic with slots for up to half a dozen microdrives.



The first annual *Sinclair QL World* awards had a roaring start in December's *QL World* and we were flooded with letters concerning the companies which you thought whould be honoured for their work with the QL. Reviewing for a moment the original plan for the awards, we asked you to vote for products for the following categories:

Best arcade game software; best business software; best strategy game; best QL disc system; best RAM upgrade; most innovative new QL product.

Starting with the last category first, the only one in which we did not make our nominations for you to vote on, the nominees for most innovative new QL product were:

The Tandata QL modem system; the ABC Gigasoft mouse and EASE system; the ICE user-friendly desk-top from Eidersoft; QL Flight from Microdeal; the Bright Star modem; Quill Version 2.0; Digital Precision Supercharge Basic compiler.

It was good to see such a wide mix of nominations from the hardware and software fields but there was one nomination which occurred again and again, the fantastic Microdeal Flight Simulator.

In the Best RAM upgrade category, we selected three companies for nomination in our entry form — Silicon Express, Simplex and PCML. It was a tight race in this field — there was even a write-in nomination for Miracles systems — but you judged the Simplex RAM upgrade the best of its type.

On the disc system front, there were six nominees — CST, PCML, Technology Research, Silicon Express, Cumana and Micro-Peripherals. The runaway winner in the disc sweepstakes was Silicon Express, with the Micro Peripherals unit achieving an honourable mention.

The Best Strategy Game category also produced a convincing winner in Psion QL Chess program which beat an impressive field of nominees which included QL Reversi, Digital Precision Super Backgammon and Psion Match Point.

Neither was business software ignored by our busy readership. The nominated software in this category was QL Integrated Accounts, QL Entrepreneur, QL Cash Trader, QL Home Finance and Transact — even though we had one write-in nomination for Xchange, which is not available on the QL. The winner was the Triptych package.

In the final category, best arcade game software, where the nominations comprised QL Cavern, QL Meteor Storm, Lands of Havoc and Zapper, it was another Microdeal program which took top prize. You voted Lands of Havoc the best QL arcade game of 1985.

Business Venture

Stevenson & Partners informed us of its soon-to-be-released business software, which has been developed on the QL, utilising the Psion Archive program and consisting of an integrated Maintenance Planning and Stock Control package.

It should be suitable for any small to medium business with a maintenance problem, for example industrial units or office buildings.

The program occupies about 20K, and, if stored on mdv1_ with the Archive program, it is then feasible to operate the program on Microdrives, using mdv2_ solely for the databases.

Price for the package will be around £80. Details from suppliers on 0428 51500.

Atari: Soft On QL?

Atari, the other major hardware company using the Motorola 68000 chip in a home computer, has launched two new machines which could herald the start of a boom in software for low-cost 68000-based computers.

The Atari 520STFM and 520STM, 512K RAM computers with and without a built-in disc drive respectively, will be available from April at £399 for the discless model (520STM) and £499 for the machine with one built-in 3.5in. disc (520STFM). QL users may be interested to note that some QL software is being converted for the machines will hope that some software developed for the Atari will also be converted for memory-upgraded 512K QLs. There are, however, two major problems in doing so.

First, the Atari machines use the Macintosh-like popular Graphics Environment Manager mouse, picture and pull-down, menu-driven system. There have been discussions between Digital Research and Sinclair about porting this to the QL, although so far no agreement has been reached.

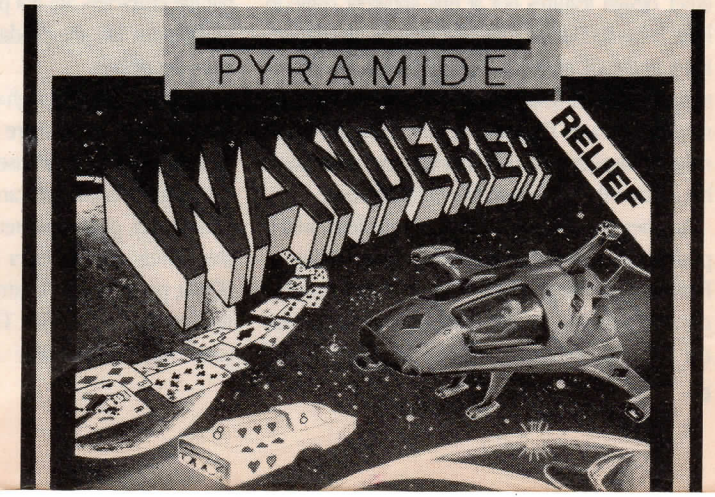
Secondly, and perhaps more important, software houses have no way of knowing exactly how many 512K QL upgrades have been sold by the various manufacturers, nor are all the expansion kits compatible with one another.

Adventures in 3D

French software house Pyramide have announced the release of six of their programs in this country. Among them are three design utilities, a programming language and two games. The most exciting of the six, and certainly one of the most original games to appear on the QL is Wanderer, a 3D arcade game in the Elite mould.

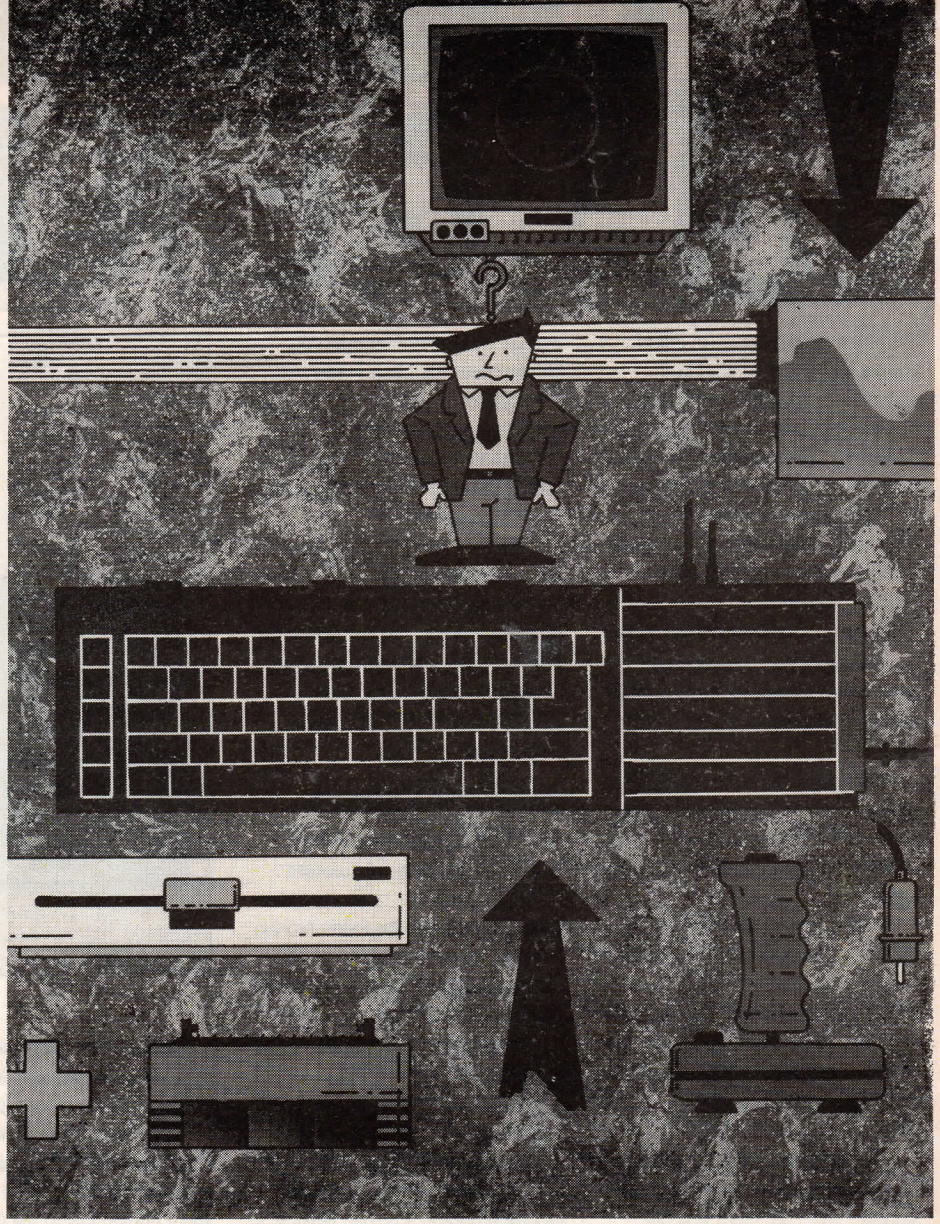
The game is supplied with a pair of red and green glasses of the type you get when you go to see a 3D film at the cinema. When viewed through the glasses, the out of register images on the screen combine to produce a remarkably realistic 3D effect. The result is quite stunning. Against a backdrop of stars, seemingly far in the distance, ships zoom out of the screen, turn, and disappear off to one side. The control panel is cleverly made to appear as though it extends out of the screen into your living room.

The other programs in the Pyramide range are Nucleon, Painter, Remember, Turtle Logo, and Othello. They are all available by Mail order from Rio Promotions Ltd, 28 Waverly Grove, London N3 3PX. 01-349 2764.



PART THREE

BITS ON THE SIDES



We continue our look at printers with a review of the prestige Brother M-1509 and other less expensive options.

AT AROUND £460, the Brother M-1509 is scarcely the cheapest of printers likely to be attached to the QL — but it is no ordinary printer. With features such as 180 characters per second, near letter quality, optional tractor feed and 136-column print width, it is likely to prove an attractive option to businesses and anyone who makes extensive use of Abacus.

There is little to fault in this printer's design. The two-tone casing has five colour-coded microswitch controls on the front panel of the type common on photocopiers. Three are the familiar on-line, line-feed and form-feed switches. The remaining two are used to select NLQ and the paper type, which can be either continuous, single-sheet or a cut-sheet feeder.

In operation, the printer performs admirably and other design features not at first apparent come to light. It has RS232 and parallel interfaces, so connecting it to the QL occasions few problems. The power supply and RS232 lead plug in on opposite sides of the machine towards the front. At first sight that looks rather strange, as well as occupying more desk space, but it leaves the paper path free of interference.

Another unusual feature is the tractor feed, which pushes the paper through rather than pulling it. Perhaps it was surprising that the Brother refused to chew up anything, despite some encouragement on our part. Had we been successful the printer would have ceased operating and turned on the check light on the front panel. That is a very useful feature for someone who has reams of hard copy to produce but lacks the time or inclination to play babysitter to the printer all day.

Next to column width, probably the most important consideration for most people is print quality. In draft mode, the Brother produces fairly unremarkable dot matrix text at 180cps. In NLQ mode the speed falls to 45cps, still impressive when compared to daisywheel output and faster than most other dot matrix printers offering NLQ. Perhaps because of the increased speed, near letter quality is not all you might expect. The print is improved sufficiently so that the individual dots which make up each character become indiscernible, but the characters are not printed cleanly. The result looks much like the product of a typewriter with a worn-out ribbon.

For those for whom high-quality printing is high on the list or priorities there are other options. Bold, underlined, italic, condensed and enlarged print can be produced under software control, i.e., from Quill. Additionally, plug-in printed circuit boards are available which provide extra fonts. One of them, the LQ200, provides 16K of extra buffer in addition to the resident 3K of the M1509. That can be used either for your own downloadable character sets or as an enlarged print buffer to free the QL for other operations while printing continues.

It is the first Brother printer to be aimed exclusively at the business end of the market and undoubtedly it will appeal to those who require high-volume, reliable output combined with flexibility — at a price.

Those who do not have more than £400 to spend on a printer will be interested to learn of the launch of two less exorbitantly-priced Brother models, the 1109 and 1409.

At a recommended price of £385, but probably cheaper depending on where you buy it, the 1409 offers virtually all the features of the 1509 without the wide carriage. Like its twin, it has RS232 and Centronics ports, built-in tractor feed, and a socket for plug-in font/RAM boards.

Large on features, small on price, is the claim made for the £225 Brother 1109. In terms of specification it differs little from the many other dot matrix printers to have appeared in the last six months. That is to say it features standard 80-column text width, 100cps, built-in tractor feed, NLQ at 25cps, three typestyles and 12 international character sets. It seems that it is now standard practice for Brother to fit all its printers with an RS232 port in addition to the Centronics and the 1109 is no exception.

ICON

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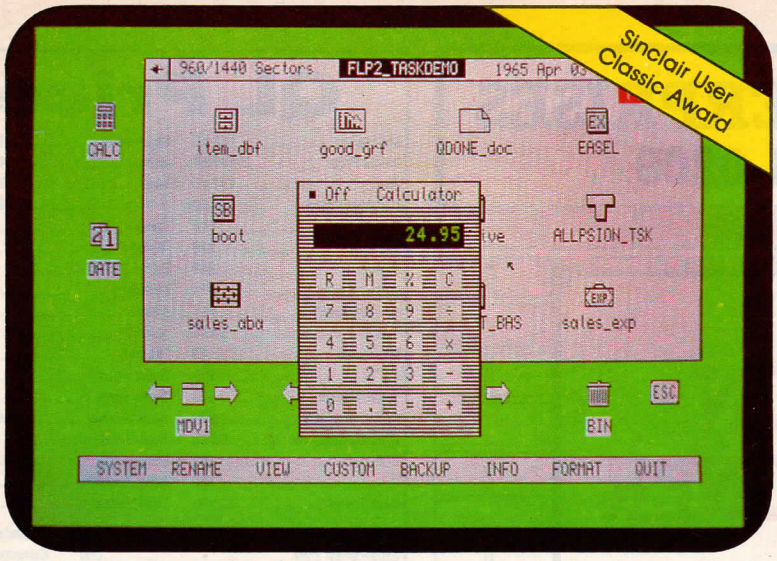
SYSTEM



ICE The complete icon based desktop system for the Sinclair QL.

ICE comes on EPROM cartridge that plugs into the cartridge ROM port at the rear of the QL.

ICE uses next to no user RAM! ICE is always available to the user instantly no need to load from microdrive or disk ICE is fully compatible with the Psion™ applications and most QL commercial software ICE is fully compatible with Superbasic programs and can be called from Superbasic ICE is fully compatible with microdrives, disk drives and RAM disks ICE can be used in conjunction with the cursor keys, a joystick or a mouse ICE is multitasking Boot into ICE or boot program TV/Monitor

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ICE makes all of the day to day housekeeping operations on your QL easy. ICE uses pictures (icons) to represent the functions and programs you are using. ICE is extremely powerful and can take action on multiple files, saving you typing commands over and over again. Most of all, ICE is very easy to use and can be managed by almost anyone!

ICE complete system £59.95

ICE SYSTEM PROGRAMS (These programs will only work with ICE)

ICE Toolkit is a library of extensions to Superbasic that allow you to use many of the ICE features in your own programs. Mouse cursor, pop-up menus, alert boxes, icons, in fact most of the ICE routines can easily be incorporated into your programs giving them that professional appearance.

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CHOice is a powerful multitask editor that allows you to run several programs simultaneously. It can be used to multitask the four Psion packages as well as many others. Most important of all, CHOice gives you direct access to ICE from other programs so that housekeeping need not mean leaving your chosen program. CHOice comes with RAM DISK software, a name and address database for Archive and a Quill/Archive mailmerge facility.

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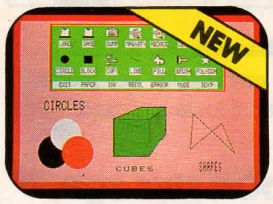

Artice is the ICE drawing program. Artice works in both TV and Monitor mode. Artice features freehand drawing with a full screen, choice of brushes, colour change, texture fill, magnify and reduce, pop-up and pull down menus, mouse style cursor, rubber, rubber band lines, circles etc, and many other features. It is fully multitasking and can be used with the CHOice software if required.

ONLY £12.95

BJ in 3D Land

NEW

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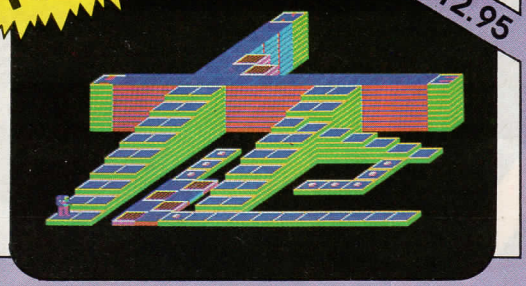

Amazing! BJ is off again, this time in a 3D maze that will pose a challenge to all. Over 75 screens of 3 dimensional action, as BJ battles against fireballs, energy zappers, lazers and even giant Chess pieces! Definitely a must!

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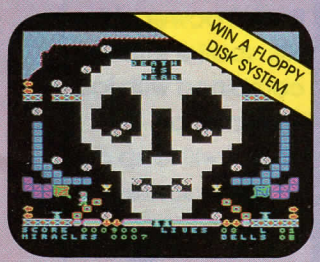

BJ The Return

Citadel

BJ The Return Drunx has died leaving BJ helpless in the caverns. Good Heavens Above!! Matilda the magic fairy has agreed to let BJ go providing he collects all the miracles from the caverns. A formidable task awaits you as you join BJ in this mega sequel to QL Caverns

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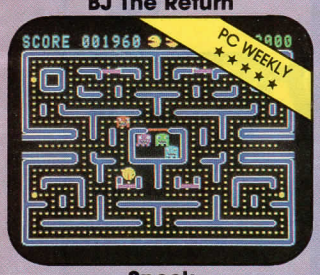
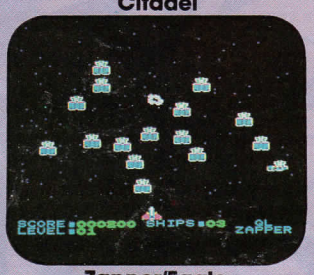


Spook



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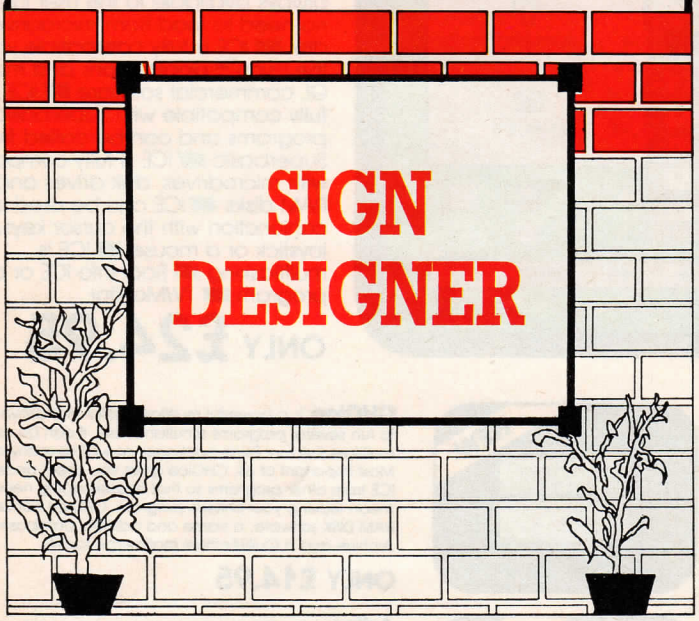

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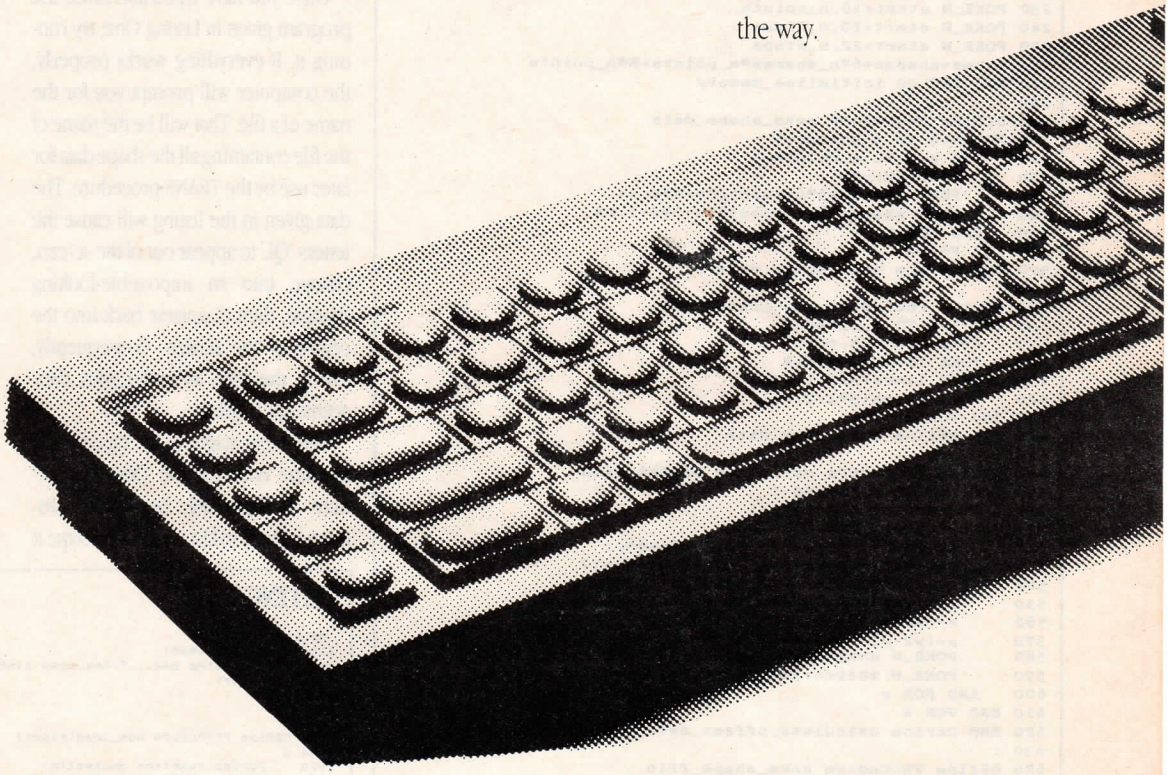
Machine code animation without an assembler? John Masterson points the way.



Imagine the loading screen of a game. The company name grows out of the screen, then collapses, twisting and changing into the company logo. Changing one shape into another need constitute only a change in size, so pictures of objects can be made to increase and decrease in size, giving a three-dimensional effect.

Alternatively, making small changes in the data will allow the routine to work as a cartoon animator. All you need to do is specify the first and last picture in each movement sequence and the routine will fill in all the positions inbetween automatically. You can specify how many of those steps there will be. There are many other possible uses, but we will leave those to your imagination. Let us see how the routine works.

The first program you need to type-in is Listing One. It is the set-up program which reads the shape data from the DATA statements starting at line 700 and converts it into a byte file. That is then saved to Microdrive or disc for use by the machine code routine. The first four numbers read are **SHAPES, POINTS, LINES** and **STEPS.**

SHAPES: This is the number of shapes in a complete sequence. For instance, if you wanted to convert a triangle into a square, which then changed into a pentagon, there would be three shapes.

POINTS: This tells the computer the maximum number of points in each shape. In the preceding example, you would need only three points for a triangle but five for a pentagon, so that value should be five.

LINES: The maximum number of lines which will ever be drawn. Again, that is five in our simple example.

STEPS: When you define different shapes, such as a triangle and a square, the computer needs to know how many in-between positions you want in the on-screen animation sequence. The machine code program can work down to an accuracy of 1/256th of a screen pixel, so effectively you can have as many steps as you like. Bear in mind that the more steps you have the slower the sequence will appear on the screen. Somewhere between 15 and 50 is usually fairly good.

The next set of numbers gives all the data for the various shapes. This should be in the form:

s1x0,s1y0,s1x1,s1y1,s1x2,s1y2,s1x3, s1y3, . . ., s1xP,s1yP
s2x0,s2y0,s2x1,s2y1,s2x2,s2y2,s2x3, s2y3, . . ., s2xP,s2yP

. . .

sQx0,sQy0,sQx1,sQy1,sQx2,sQy2, sQx3,sQy3, . . ., sQxP,sQyP

where: sN = shape number N.
xN = x-co-ordinate of point N.
yN = y-co-ordinate of point N.
Q = Total number of shapes.
P+1 = Total number of points

LISTING ONE

```
100 CLS
110 initialise_memory
120 read_shape_data
130 read_line_data
140 calculate_offset_data
150 save_shape_file
160 :
170 DEFine PROCedure initialise_memory
180 READ n_shapes,n_points,n_lines,n_steps
190 memory=(6*n_shapes*n_points)+(8*n_points)+(3*n_lines)+24
200 start=RESPR(memory)
210 shapes=start+24
220 POKE_W start+16,n_shapes
230 POKE_W start+18,n_points
240 POKE_W start+20,n_lines
250 POKE_W start+22,n_steps
260 lines=shapes+6*n_shapes*n_points+8*n_points
270 END DEFine initialise_memory
280 :
290 DEFine PROCedure read_shape_data
300 FOR s=0 TO n_shapes-1
310   FOR p=0 TO n_points-1
320     READ x%,y%
330     POKE shapes+6*n_points*s+6*p,x%
340     POKE shapes+6*n_points*s+6*p+1,y%
350   END FOR p
360 END FOR s
370 END DEFine read_shape_data
380 :
390 DEFine PROCedure read_line_data
400 FOR l=0 TO n_lines-1
410   READ p1%,p2%,col
420   POKE lines+3*l,p1%
430   POKE lines+3*l+1,p2%
440   POKE lines+3*l+2,col
450 END FOR l
460 END DEFine read_line_data
470 :
480 DEFine PROCedure calculate_offset_data
490 FOR s=0 TO n_shapes-1
500   FOR p=0 TO n_points-1
510     sh=(s+1) MOD n_shapes
520     x1=PEEK(shapes+6*n_points*s+6*p)
530     y1=PEEK(shapes+6*n_points*s+6*p+1)
540     x2=PEEK(shapes+6*n_points*sh+6*p)
550     y2=PEEK(shapes+6*n_points*sh+6*p+1)
560     x=(x2-x1)/n_steps
570     y=(y2-y1)/n_steps
580     POKE_W shapes+6*n_points*s+6*p+2,INT(256*x)
590     POKE_W shapes+6*n_points*s+6*p+4,INT(256*y)
600   END FOR p
610 END FOR s
620 END DEFine calculate_offset_data
630 :
640 DEFine PROCedure save_shape_file
650 INPUT \"Filename (incl. device)? ";f$
660 DELETE f$
670 SBYTES f$,start,memory
680 END DEFine save_shape_file
690 :

700 REMark SHAPES,POINTS,LINES,STEPS
710 :
720 DATA 3,18,15,30
730 :
740 REMark SHAPE DATA
750 :
760 DATA 120,100,120,100,120,100,120,100,120,100,120,100
770 DATA 120,100,120,100,120,100,120,100,120,100,120,100
780 DATA 120,100,120,100,120,100,120,100,120,100,120,100
790 :
800 DATA 98,160,80,40,116,40,98,160,116,40,98,160
810 DATA 116,160,100,120,100,100,116,160,100,100,116,160
820 DATA 124,40,124,160,160,160,160,160,132,144,124,40
830 :
840 DATA 142,160,80,160,80,144,137,144,84,132,134,132
850 DATA 84,132,116,40,124,40,92,132,127,52,100,132
860 DATA 127,52,156,148,150,160,123,65,142,160,119,79
870 :
880 REMark LINE DATA
890 :
900 DATA 0,1,1,1,2,1,2,3,1,2,4,1,4,5,1
910 DATA 6,7,2,7,8,2,8,9,2,8,10,2,10,11,2
920 DATA 12,13,3,13,14,3,14,15,3,14,16,3,16,17,3
```

Above is the principal SuperBasic listing for operating our simple animation demonstration. It's worth typing and running before proceeding with Listing two.

All co-ordinates are given as numbers in the range 0 to 255, using the co-ordinate system shown in figure one. In the eight-colour mode for which the routine is designed that will allow you to specify co-ordinates down to the nearest pixel.

Finally, you must tell the computer which lines are joined and in which of the eight colours they are to be drawn. That is given as a list of lines, with each line being defined by: **Start Point, End Point, Colour**

where: Start/End Points refer to the point co-ordinates given in the shape data section. So, "0,1,7" would specify that point zero — i.e., x0,y0 — is connected to point one — i.e., x1,y1 — with a line of colour seven — i.e., white.

Once you have typed and saved the program given in Listing One, try running it. If everything works properly, the computer will prompt you for the name of a file. That will be the name of the file containing all the shape data for later use by the TRANS procedure. The data given in the listing will cause the letters 'QL' to appear out of the screen, change into an impossible-looking triangle, then disappear back into the centre of the screen. Consequently, saving the data as 'mdv1_qltri_data' seems appropriate.

The next stage is to type-in the machine code for the TRANS procedure. A SuperBasic hex-loader program is given in Listing Two. Just type it as shown, then run it. It will define TRANS automatically as a resident procedure, usable from SuperBasic, much the same as any other SuperBasic procedure. If you are told that the 'checksum is incorrect', then you have probably made an error when typing-in the DATA starting at line 2000. When the program has run, typing:

sbytes mdv1_trans_obj,start,650

will save the machine code separately to Microdrive one. Thus, rather than having to load and run the SuperBasic loader every time you want to use the TRANS procedure, all you need type is:

a=respr(650)
lbytes mdv1_trans_obj,a
call a

Anybody with an assembler, may prefer to use the assembly code listing three when entering the machine code.

Finally, we are ready to try the procedure. Having run the hex-loader, without turning off the machine, type 'NEW' and enter the program shown in

LISTING TWO

```
100 CLS
110 start=RESPR(650)
120 PRINT"Loading Hex...":hex_load start
130 CALL start
140 STOP
150 :
160 :
1000 DEFine PROCedure hex_load(start)
1010 :
1020    DEFine FuNction decimal(x)
1030    RETurn CODE(h$(x))-48-7*(h$(x)>"9")
1040    END DEFine decimal
1050 :
1060 byte = 0 : checksum = 0
1070 RESTORE 2000
1080 READ h$ : IF h$="*" THEN GO TO 1240
1090 IF LEN(h$)<>2*INT(LEN(h$)/2) THEN
1100    PRINT"Odd number of hex digits in: ":h$
1110    STOP
1120 END IF
1130 FOR b=1 TO LEN(h$) STEP 2
1140    hb=decimal(b):lb=decimal(b+1)
1150    IF hb<0 OR hb>15 OR lb<0 OR lb>15 THEN
1160       PRINT"Illegal hex digit in: ";h$
1170       STOP
1180    END IF
1190    POKE start+byte,16*hb+lb
1200    checksum=checksum+16*hb+lb
1210    byte=byte+1
1220 END FOR b
1230 GO TO 1080
1240 READ check
1250 IF check<>checksum THEN
1260    PRINT"Checksum incorrect. Recheck data."
1270    STOP
1280 ELSE
1290    PRINT"Checksum is correct."
1300    PRINT"Data entered at: ";start
1310 END IF
1320 END DEFine hex_load
2000 DATA "30780110","43FA0006","4E90","4E75","0001","000E","05","5452414E53"
2010 DATA "000000000000","30780118","4E90","6600004A","70F1","0C430004"
2020 DATA "66000040","24769800","2E369804","5387","49FA0234","1976980B0005"
2030 DATA "3976980E0006","61000024","226A0008","302A0012","5340","4299"
2040 DATA "51C8FFFC","2652","6100004C","51CFFFF8","6100009E","4280","4E75"
2050 DATA "248A","069200000018","302A0012","C0EA0010","E388","2200","E388"
2060 DATA "D081","25520004","D1AA0004","302A0012","48C0","E588"
2070 DATA "256A00040008","D1AA0008","256A0008000C","D1AA000C"
2080 DATA "4E75","382A0010","5344","2A4B","264D","6100002E","3C2A0016","5346"
2090 DATA "61000044","362C0006","343C0FFF","51CAFFFE","51CBFFF6","61000030"
2100 DATA "6100009E","51CEFFF6","51CCFFD2","4E75","302A0012","5340",
          "2A6A0004"
2110 DATA "224B","3A11","3C05","4205","3AC5","E14E","3AC6","5C89","51C8FFF0"
2120 DATA "4E75","206A000C","226A0004","2A6A0008","3A2A0014","5345","4242"
2130 DATA "1418","E54A","4243","1618","E54B","18B52000","197520020001"
2140 DATA "197530000002","197530020003","196C00050004","48E7FF04"
2150 DATA "61000054","4CDF20FF","18B12000","197120020001","197130000002"
2160 DATA "197130020003","19580004","48E7FF04","6100002E","4CDF20FF"
2170 DATA "51CDFFA4","4E75","302A0012","5340","206A0008","226A0004"
2180 DATA "2A4B","548D","20D1","321D","D359","321D","D359","51C8FFF2"
2190 DATA "4E75","6100008E","263C00010001","122C0002","9214",
          "64000006","4401"
2200 DATA "4403","4843","142C0003","942C0001","64000006","4402","4403","1001"
2210 DATA "8002","6700005C","2803","1002","B001","6500000E","02840000FFFF"
2220 DATA "C342","60000008","0284FFFF0000","4247","1E01","5307","1C01","E20E"
2230 DATA "1006","D002","65000008","B001","6500000C","9001","1C00","2A03"
2240 DATA "60000006","1C00","2A04","DB2C0001","4845","DB14","48E77C00"
2250 DATA "6100000E","4CDF003E","51CFFFCE","4280","4E75","1214","1801"
2260 DATA "142C0001","1A02","162C0004","E20C","0244007E","2A7C00020000"
2270 DATA "DAC4","EF4D","DAC5","ED4B","3803","EF4C","02448000","024300C0"
2280 DATA "8644","C23C0003","E309","343C7F3F","E27A","E27B","C555","8755"
2290 DATA "4E75","0000000000000000","*",43625
```

LISTING THREE

```
 LOC       OBJECT          STMT    SOURCE STATEMENT
0000'                        1 m83
                             2 *
                             3 * This will include the new procedure TRANS loc,reps,pap,dly
                             4 *     where: loc  = start of picture data
                             5 *            reps = number of repetitions
                             6 *            pap  = paper colour (for rubbing out lines)
                             7 *            dly  = delay between shapes (50 = 1 sec. approx.)
                             8 *
                             9 * First add the procedure
                            10 *
0000' 3078 0110             11          MOVE.W   $110,A0          $110 = BP.INIT = Add proc/func
0004' 43FA 0006             12          LEA.L    PROC,A1          Link in procedure
0008' 4E90                  13          JSR      (A0)
000A' 4E75                  14          RTS
000C' 0001                  15 PROC     DC.W     1                Number of procedures
000E' 000E                  16          DC.W     TRANS-*          Relative location of proc
0010' 05                    17          DC.B     5                Length of proc name
0011' 5452 414E 53          18          DC.B     'TRANS'          Name of procedure
0016' 0000                  19          DC.W     0                End of procedures
0018' 0000                  20          DC.W     0                Number of functions
001A' 0000                  21          DC.W     0                End of functions
                            22 *
                            23 * This is the TRANS procedure **********************
                            24 *
                            25 * Get the procedure parameters
                            26 *
001C' 3078 0118             27 TRANS    MOVE.W   $118,A0          $112 = CA.GTLIN (longs)
0020' 4E90                  28          JSR      (A0)
0022' 6600 004A             29          BNE      EXIT             Exit on error
0026' 70F1                  30          MOVEQ    #-15,D0          D0 = Parameter error
0028' 0C43 0004             31          CMPI.W   #4,D3            Should be 4 parameters
002C' 6600 0040             32          BNE      EXIT             Branch if not
0030' 2476 9800             33          MOVE.L   0(A6,A1.L),A2    A2 = Start address of data
0034' 2E36 9804             34          MOVE.L   4(A6,A1.L),D7    D7 = Number of repetitions
0038' 5387                  35          SUBQ.L   #1,D7
003A' 49FA 0234             36          LEA.L    TABLE,A4         A4 = Plotting Table
003E' 1976 980B 0005        37          MOVE.B   11(A6,A1.L),5(A4) Get Paper colour
0044' 3976 980E 0006        38          MOVE.W   14(A6,A1.L),6(A4) Get DELAY period
004A' 6100 0024             39          BSR      CALCADDR
004E' 226A 0008             40          MOVE.L   8(A2),A1         A1 = NEXT
0052' 302A 0012             41          MOVE.W   18(A2),D0        D0 = n_points
0056' 5340                  42          SUBQ.W   #1,D0            D0 = n_points - 1
0058' 4299                  43 CLRNEXT  CLR.L    (A1)+            Clear the NEXT table,
005A' 51C8 FFFC             44          DBF      D0,CLRNEXT          for n_points
005E' 2652                  45 MAINLOOP MOVE.L   (A2),A3          A3 = Present SHAPE
0060' 6100 004C             46          BSR      SEQUENCE
0064' 51CF FFF8             47          DBF      D7,MAINLOOP
0068' 6100 009E             48          BSR      DRAWSH           Draw complete final shape
006C' 4280                  49          CLR.L    D0               Signal no errors
006E' 4E75                  50 EXIT     RTS                       Return to SuperBASIC
                            51 *
                            52 * Calculate and store the table addresses
                            53 *
0070' 248A                  54 CALCADDR MOVE.L   A2,(A2)          (A2) = Start of 'data'
0072' 0692 0000 0018        55          ADDI.L   #24,(A2)         (A2) = 'data' + 24

0078' 302A 0012             56          MOVE.W   18(A2),D0        D0 = n_points
007C' C0EA 0010             57          MULU     16(A2),D0        D0 = n_points * n_shapes
0080' E388                  58          LSL.L    #1,D0            D0 = 6 * D0
0082' 2200                  59          MOVE.L   D0,D1
0084' E388                  60          LSL.L    #1,D0
0086' D081                  61          ADD.L    D1,D0
0088' 2552 0004             62          MOVE.L   (A2),4(A2)       PREV = SHAPES
008C' D1AA 0004             63          ADD.L    D0,4(A2)         PREV = SHAPES + D0
0090' 302A 0012             64          MOVE.W   18(A2),D0        D0 = n_points
0094' 48C0                  65          EXT.L    D0               D0 - Long
0096' E588                  66          LSL.L    #2,D0            D0 = 4 * n_points
0098' 256A 0004 0008        67          MOVE.L   4(A2),8(A2)      NEXT = PREV
009E' D1AA 0008             68          ADD.L    D0,8(A2)         NEXT = PREV + D0
00A2' 256A 0008 000C        69          MOVE.L   8(A2),12(A2)     LINES = NEXT
00A8' D1AA 000C             70          ADD.L    D0,12(A2)        LINES = NEXT + D0
00AC' 4E75                  71          RTS                       Return to MAINLOOP
                            72 *
                            73 * This is the main drawing loop. It will follow through
                            74 *     one complete sequence before returning to the
                            75 *     MAINLOOP, which checks the number of repetitions.
                            76 *
00AE' 382A 0010             77 SEQUENCE MOVE.W   16(A2),D4        D4 = n_shapes
00B2' 5344                  78          SUBQ.W   #1,D4            D4 = n_shapes - 1
00B4' 2A4B                  79          MOVE.L   A3,A5            For first loop (Next instr)
00B6' 264D                  80 NSHAPE   MOVE.L   A5,A3            A3 = Present SHAPES
00B8' 6100 002E             81          BSR      UPPTS
00BC' 3C2A 0016             82          MOVE.W   22(A2),D6        D6 = n_steps
00C0' 5346                  83          SUBQ.W   #1,D6            D6 = n_steps - 1
00C2' 6100 0044             84          BSR      DRAWSH           Draw main shape for delay
00C6' 362C 0006             85          MOVE.W   6(A4),D3         D3 = User delay
00CA' 343C 0FFF             86 DELAY    MOVE.W   #$0FFF,D2        D2 = Set delay
00CE' 51CA FFFE             87 WAIT     DBF      D2,WAIT
00D2' 51CB FFF6             88          DBF      D3,DELAY
00D6' 6100 0030             89 STEPS    BSR      DRAWSH
00DA' 6100 009E             90          BSR      TRANSH
00DE' 51CE FFF6             91          DBF      D6,STEPS
00E2' 51CC FFD2             92          DBF      D4,NSHAPE
00E6' 4E75                  93          RTS                       Return to MAINLOOP
                            94 *
                            95 * Update the PREV table for start of next shape
                            96 *
00E8' 302A 0012             97 UPPTS    MOVE.W   18(A2),D0        D0 = n_points
00EC' 5340                  98          SUBQ.W   #1,D0            D0 = n_points - 1
00EE' 2A6A 0004             99          MOVE.L   4(A2),A5         A5 = PREV
```

```
 LOC       OBJECT          STMT    SOURCE STATEMENT
00F2' 224B                 100          MOVE.L   A3,A1            A1 = SHAPES
00F4' 3A11                 101 SETPREV  MOVE.W   (A1),D5          D5 = XXXXXXXX YYYYYYYY
00F6' 3C05                 102          MOVE.W   D5,D6            D6 = XXXXXXXX YYYYYYYY
00F8' 4205                 103          CLR.B    D5               D5 = XXXXXXXX 00000000
00FA' 3AC5                 104          MOVE.W   D5,(A5)+
00FC' E14E                 105          LSL.W    #8,D6            D6 = YYYYYYYY 00000000
00FE' 3AC6                 106          MOVE.W   D6,(A5)+
0100' 5C89                 107          ADDQ.L   #6,A1            A1 = Next point
0102' 51C8 FFF0            108          DBF      D0,SETPREV
0106' 4E75                 109          RTS
                           110 *
                           111 * This routine will erase the last shape draw, and draw
                           112 *     the next shape, one line at a time.
                           113 *
0108' 206A 000C            114 DRAWSH   MOVE.L   12(A2),A0         A0 = LINES
010C' 226A 0004            115          MOVE.L   4(A2),A1         A1 = PREV
0110' 2A6A 0008            116          MOVE.L   8(A2),A5         A5 = NEXT
0114' 3A2A 0014            117          MOVE.W   20(A2),D5        D5 = n_lines
0118' 5345                 118          SUBQ.W   #1,D5            D5 = n_lines - 1
011A' 4242                 119 DOSHAPE  CLR.W    D2               D2 = 0
011C' 1418                 120          MOVE.B   (A0)+,D2         D2 = No. point one
011E' E54A                 121          LSL.W    #2,D2            D2 = 4 * D2
0120' 4243                 122          CLR.W    D3               D3 = 0
0122' 1618                 123          MOVE.B   (A0)+,D3         D3 = No. point two
0124' E54B                 124          LSL.W    #2,D3            D3 = 4 * D3
0126' 18B5 2000            125          MOVE.B   0(A5,D2.W),(A4)   Get NEXT.X1
012A' 1975 2002 0001       126          MOVE.B   2(A5,D2.W),1(A4)  Get NEXT.Y1
0130' 1975 3000 0002       127          MOVE.B   0(A5,D3.W),2(A4)  Get NEXT.X2
0136' 1975 3002 0003       128          MOVE.B   2(A5,D3.W),3(A4)  Get NEXT.Y2
013C' 196C 0005 0004       129          MOVE.B   5(A4),4(A4)       Colour = Paper
0142' 48E7 FF04            130          MOVEM.L  D0-D7/A5,-(A7)
0146' 6100 0054            131          BSR      DRAW             Rubout old line
014A' 4CDF 20FF            132          MOVEM.L  (A7)+,D0-D7/A5
014E' 18B1 2000            133          MOVE.B   0(A1,D2.W),(A4)   Get PREV.X1
0152' 1971 2002 0001       134          MOVE.B   2(A1,D2.W),1(A4)  Get PREV.Y1
0158' 1971 3000 0002       135          MOVE.B   0(A1,D3.W),2(A4)  Get PREV.X2
015E' 1971 3002 0003       136          MOVE.B   2(A1,D3.W),3(A4)  Get PREV.Y2
0164' 1958 0004            137          MOVE.B   (A0)+,4(A4)       Get line colour
0168' 48E7 FF04            138          MOVEM.L  D0-D7/A5,-(A7)
016C' 6100 002E            139          BSR      DRAW             Draw new line
0170' 4CDF 20FF            140          MOVEM.L  (A7)+,D0-D7/A5
0174' 51CD FFA4            141          DBF      D5,DOSHAPE
0178' 4E75                 142          RTS
                           143 *
                           144 * Copy the lines from PREV to NEXT, then add the step
                           145 *     increments for the subsequent drawing.
                           146 *
017A' 302A 0012            147 TRANSH   MOVE.W   18(A2),D0         D0 = n_points
017E' 5340                 148          SUBQ.W   #1,D0            D0 = n_points - 1
0180' 206A 0008            149          MOVE.L   8(A2),A0         A0 = NEXT
0184' 226A 0004            150          MOVE.L   4(A2),A1         A1 = PREV
0188' 2A4B                 151          MOVE.L   A3,A5            A5 = SHAPES
018A' 548D                 152 UPDATE   ADDQ.L   #2,A5            A5 = SHAPES(dX)
018C' 20D1                 153          MOVE.L   (A1),(A0)+       NEXT point = PREV point
018E' 321D                 154          MOVE.W   (A5)+,D1         D1 = dX increment
0190' D359                 155          ADD.W    D1,(A1)+         Add dX increment
0192' 321D                 156          MOVE.W   (A5)+,D1         D1 = dY increment
0194' D359                 157          ADD.W    D1,(A1)+         Add dY increment
0196' 51C8 FFF2            158          DBF      D0,UPDATE
019A' 4E75                 159          RTS
                           160 *
                           161 * Draws the line (X1,Y1) to (X2,Y2) in Colour.
                           162 *       where:  0(A4) = X1;  1(A4) = Y1
                           163 *               2(A4) = X2;  3(A4) = Y2
                           164 *               4(A4) = Colour
                           165 *     Coordinates are from (0,0) = Top-Left, and are in
                           166 *     the range 0 to 255. This will specify individual
                           167 *     pixels in the 8-colour mode.
                           168 *
019C' 6100 008E            169 DRAW     BSR      PLOT             Plot first point
01A0' 263C 0001 0001       170          MOVE.L   #$00010001,D3    D3 = Diagonal increments
01A6' 122C 0002            171          MOVE.B   2(A4),D1         D1 = X2
01AA' 9214                 172          SUB.B    (A4),D1          D1 = X2 - X1
01AC' 6400 0006            173          BCC      X2TOX1           Branch if X2>=X1
01B0' 4401                 174          NEG.B    D1               D1 = X1 - X2
01B2' 4403                 175          NEG.B    D3               D3(X) = -1
01B4' 4843                 176 X2TOX1   SWAP     D3               Get D3(Y) in low word
01B6' 142C 0003            177          MOVE.B   3(A4),D2         D2 = Y2
01BA' 942C 0001            178          SUB.B    1(A4),D2         D2 = Y2 - Y1
01BE' 6400 0006            179          BCC      Y2TOY1           Branch if Y2>=Y1
01C2' 4402                 180          NEG.B    D2               D2 = Y1 - Y2
01C4' 4403                 181          NEG.B    D3               D3(Y) = -1
01C6' 1001                 182 Y2TOY1   MOVE.B   D1,D0            Check for point plot.
01C8' B002                 183          OR.B     D2,D0               and return if both
01CA' 6700 005C            184          BEQ      ENDDRAW             are zero
01CE' 2803                 185          MOVE.L   D3,D4             D4 = Ver/Hor increments
01D0' 1002                 186          MOVE.B   D2,D0             D2 = dY
01D2' B001                 187          CMP.B    D1,D0             Compare dY-dX
01D4' 6500 000E            188          BCS      XBIG              Branch if dX > dY
01D8' 0284 0000 FFFF       189          ANDI.L   #$0000FFFF,D4     D4 = 0Y
01DE' C342                 190          EXG      D1,D2             Swap dX and dY
01E0' 6000 0008            191          BRA      YBIG
01E4' 0284 FFFF 0000       192 XBIG     ANDI.L   #$FFFF0000,D4     D4 = X0
01EA' 4247                 193 YBIG     CLR.W    D7
01EC' 1E01                 194          MOVE.B   D1,D7             Number of steps in plot
01EE' 5307                 195          SUBQ.B   #1,D7
01F0' 1C01                 196          MOVE.B   D1,D6             D6 = Diff/2 for best line
01F2' E20E                 197          LSR.B    #1,D6
01F4' 1006                 198 NEXT     MOVE.B   D6,D0             D0 = Largest diff/2
01F6' D002                 199          ADD.B    D2,D0             D0 = D0 + smallest diff
```

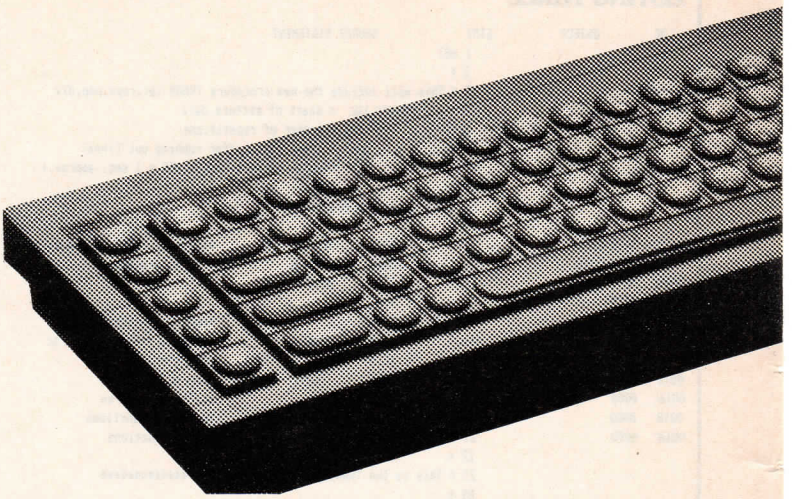
```
  LOC       OBJECT         STMT            SOURCE STATEMENT

01F8' 6500 0008           200         BCS     DIAGONAL        Branch to diagonal step
01FC' B001                201         CMP.B   D1,D0           Branch if largest diff is
01FE' 6500 000C           202         BCS     HORIVERT           greater to hori/vert step
0202' 9001                203 DIAGONAL SUB.B  D1,D0           Subtract largest difference
0204' 1C00                204         MOVE.B  D0,D6              and store new result
0206' 2A03                205         MOVE.L  D3,D5           Retrieve diagonal increments
0208' 6000 0006           206         BRA     STEP
020C' 1C00                207 HORIVERT MOVE.B  D0,D6          Store new result
020E' 2A04                208         MOVE.L  D4,D5           Retrieve hor/vert increments
0210' DB2C 0001           209 STEP    ADD.B   D5,1(A4)        Add dY to Y1
0214' 4845                210         SWAP    D5              Get D5(X)
0216' DB14                211         ADD.B   D5,(A4)         Add dX to X1
0218' 48E7 7C00           212         MOVEM.L D1-D5,-(A7)     Stack registers
021C' 6100 000E           213         BSR     PLOT            Plot next point
0220' 4CDF 003E           214         MOVEM.L (A7)+,D1-D5     Restore registers
0224' 51CF FFCE           215         DBF     D7,NEXT         Reduce count, and loop
0228' 4280                216 ENDDRAW CLR.L   D0              No errors
022A' 4E75                217         RTS
                          218 *
                          219 * PLOT will plot a point in 8 colour mode. The point
                          220 *     is specified by (A4,B)=X, 1(A4,B)=Y & 4(A4,B)=Colour.
                          221 *
022C' 1214                222 PLOT    MOVE.B  (A4),D1         D1 = x-coordinate
022E' 1801                223         MOVE.B  D1,D4           Copy to D4
0230' 142C 0001           224         MOVE.B  1(A4),D2        D2 = y-coordinate
0234' 1A02                225         MOVE.B  D2,D5           Copy to D5
0236' 162C 0004           226         MOVE.B  4(A4),D3        D3 = Colour
023A' E20C                227         LSR.B   #1,D4           D4 = D4/2 for Bytes
023C' 0244 007E           228         ANDI.W  #$007E,D4       D4 = 0 to 126 (even)
0240' 2A7C 0002 0000      229         MOVE.L  #$20000,A5      A5 = Start of screen
0246' DAC4                230         ADDA.W  D4,A5           A5 = A5 + x-coord
0248' EF4D                231         LSL.W   #7,D5           y = 128 * y
024A' DAC5                232         ADDA.W  D5,A5           A5 = A5 + y-coord
024C' ED4B                233         LSL.W   #6,D3           D3 = .......R GB000000
024E' 3803                234         MOVE.W  D3,D4           D4 = D3
0250' EF4C                235         LSL.W   #7,D4           D4 = RGB00000 00000000
0252' 0244 B000           236         ANDI.W  #$B000,D4       D4 = R0000000 00000000
0256' 0243 00C0           237         ANDI.W  #$00C0,D3       D3 = 00000000 GB000000
025A' 8644                238         OR.W    D4,D3           D3 = R0000000 GB000000
025C' C23C 0003           239         AND.B   #3,D1           D1 = 0 to 3
0260' E309                240         LSL.B   #1,D1           D1 = 0 to 6 (even)
0262' 343C 7F3F           241         MOVE.W  #$7F3F,D2       D2 = 01111111 00111111
0266' E27A                242         ROR.W   D1,D2           Rotate mask
0268' E27B                243         ROR.W   D1,D3           Rotate colour
026A' C555                244         AND.W   D2,(A5)         Mask screen
026C' 8755                245         OR.W    D3,(A5)         OR colour to screen
026E' 4E75                246         RTS                     Return
                          247
0270' =0008               248 TABLE   DS.B    8
                          249
                          250         END


No errors found in this Assembly
```

LISTING FOUR

```
100 b=RESPR(1000)
110 LBYTES mdv1_qltri_data,b
140 PAPER#2,0:CLS#2:CLS#0
145 REPeat loop
150     TRANS b,1,0,150
160     CLS#2
170     a$=INKEY$(0):IF a$="" THEN GO TO 170
180 END REPeat loop
```

LISTING FIVE

```
700 REMark SHAPES,POINTS,LINES,STEPS
710 :
720 DATA 5,18,15,40
730 :
740 REMark SHAPE DATA
750 :
760 DATA 255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,0
770 DATA 255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,0,255,0
780 :
790 DATA 0,220,4,208,27,188,29,179,38,185,38,203,32,200,9,223,9,214
800 DATA 32,192,38,185,27,188,32,192,32,200,4,208,9,214,9,223,0,220
810 :
820 DATA 0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220
830 DATA 0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220
840 :
850 DATA 0,160,10,150,17,160,26,153,33,163,31,175,41,175,44,190,51,212
860 DATA 46,224,54,240,10,182,21,177,22,186,23,215,28,217,25,
        228,52,192
870 :
880 DATA 0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220
890 DATA 0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220,0,220
900 :
910 REMark LINE DATA
920 :
930 DATA 0,1,3,1,2,3,2,3,3,3,4,3,4,5,3,5,6,3,6,7,3,7,17,3
940 DATA 17,8,3,8,9,3,9,10,3,14,15,1,15,16,1,11,12,1,12,13,1
```



Listing Four. Alternatively, type the three lines shown above, then enter Listing Four. When typing the listing, you will notice that TRANS is shown in upper case, even if you type it in lower case. That indicates that the TRANS resident procedure is in memory. Running the program will show the 'QL' to 'impossible-triangle' sequence. Note that line 110 loads the data file created by listing one, so you will have to change that line if you have called your file something different.

When using TRANS you have to specify four parameters. If you do not do that you will receive a 'bad parameter' message. The form of the TRANS command is:

TRANS loc,reps,bcol,delay

loc: is the start location of the data to be used for the transformation. That means you could easily have the data for a number of transformations in memory at the same time and specify with which data you wish the routine to work when you call it.

reps: gives the number of repetitions of the complete sequence executed before returning to Basic.

bcol: is the background colour used when erasing previously-drawn lines in the sequence. In the foregoing example, we cleared the screen to black (zero), then used black lines. Unusual effects can be achieved by specifying different colour. Try running the program again with TRANS b,1,7,150. That will leave a trail of white lines.

delay: tells the routine how long to stop between each shape in the sequence. Fifty gives a delay of approximately one second.

You will no doubt be able to think of plenty of ways to use the routine, but as a further example, the data given in Listing Five — which should replace the data given in Listing One — will show a simple exploding missile animation sequence.

Technical Notes:

The assembly code shown in listing three is fully-anotated, so should be reasonably easy to follow. If you wish to make the routine work in four-colour mode, just change the PLOT routine at the end of the listing. When doing that, remember that horizontal co-ordinates will still be specified in the range 0 to 255. Changing that would require much more severe alterations.

The DRAW routine is a fast line-drawing utility which you may find useful for other applications. For speed, DRAW ignores screen-windows and that should be considered when using TRANS in your programs.

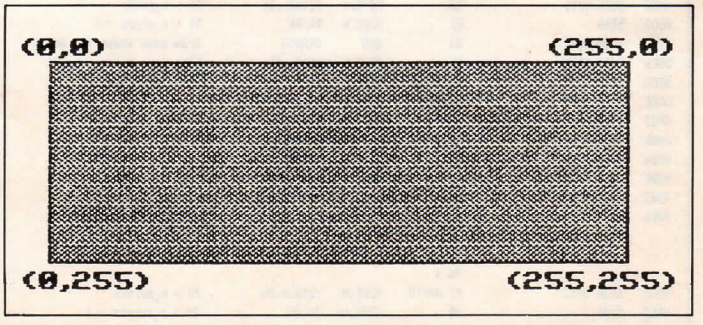


Figure One. Screen co-ordinates range from 0 to 255.

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QMON II is a low level monitor/debugger designed specifically for the QL and its operating system QDOS. It is ideally suited to the task of checking and debugging assembly language programs, and extensions to the SuperBASIC interpreter. Even if you already have a monitor/debugger for your QL, QMON II will provide extra assembly language programming power. QMON can also be used to monitor programs written in high level languages.

QMON is designed to integrate into the QDOS environment. This makes it possible to monitor just one job in the QL, or all the jobs that are executing. While tracing a job, QMON will normally skip the entries into QDOS, but it can trace right through QDOS. QMON does not interfere with QDOS so it is entirely feasible to examine one job in the QL, while other jobs continue unimpeded.

QMON has an extensive range of facilities including a window based memory editor, single and multi stepping, tracing and back-tracing with fixed and conditional breakpoints, as well as a macro command facility for tracing and patching, together with an unusually powerful set of commands for examining and altering machine code and data.

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QTKII

QTK II, the QL Supertoolkit 2, is a rewritten version of the original QL Toolkit. It now has over 100 facilities for program development, command language, SuperBASIC programming, extensions to the console, Microdrive and networking facilities.

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Psion 123

IF you ever envy the IBM's ability to go quickly from word processing to a spreadsheet with programs like Lotus 123 it can be done with a QL (JM ROM) and issue 2 of the Psion Software.

Format a cartridge
Copy Quill from master
Copy Print_Dat from master
Copy Abacus from master

Save the boot program which allows it to operate like Lotus 123. Obviously we do not use install_bas or convert_bas or the help files but everything works, even printing, and the system resets when finished. The last few lines which allow the reset are from Leon Heller. I am sure it will also work with Archive and Easel but as I do not use these programs much I have not tried it. This completely fills the cartridge so don't expect to add anything to it.

```
100 CLEAR
110 WINDOW 512,256,0,0:CSIZE 2,1:CLS
120 AT 2,11:PRINT "QL QUILL PRESS  F1"
130 AT 6,11:PRINT "QL ABACUS PRESS F2"
140 A$= INKEY$(1000)
150 IF CODE(A$) =232 THEN GO TO 190
160 IF CODE(A$)=236 THEN GO TO 200
170 CLOSE #1:CLOSE #2:WINDOW #0,400,20,35,215
180 GO TO 140
190 EXEC_W mdv1_quill:GO TO 220
200 EXEC_W MDV1_ABACUS:GO TO 220
210 OPEN #1,scr:OPEN #2,scr
220 reset =RESPR(12)
230 FOR i=0 TO 11
240 READ v
250 POKE reset+i,v
260 END FOR i
270 :
280 CALL reset
290 :
300 DATA 78,64,70,252,39,0,32,120,0,4,78,208
```

Whatever happened to the Sinclair wafer chip? and also Psion Exchange on ROM cartridge for the QL. Could one put one's own Psion software on the EPROMs being advertised by Camel Products or Micro Enterprises at the back of this magazine?

Martin McHugo,
Co. Kildare, Ireland.

Network News

CONGRATULATIONS on your rescue of the entire QL publishing scene. I received my copy of your magazine today and am writing to say how much I enjoyed reading it.

I am also writing to introduce QNET-2. We are a group of three individual QL owners who run three pages on Micronet 800's Gallery section. These are to be found on pages *323000112, *32300037 and *323000223. Regular topics include news, reviews of hardware and software, hints and tips, technical helpline and competitions. It was set up in November last year after Micronet 800 suspended their QNET microbase on *80040.

We currently have almost 100 members and membership is growing at a rate of four or five a week. All three pages are now in the top twenty most accessed Gallery pages on Prestel. My page is currently at number three — not bad for a machine that is not supposed to have much support on Prestel!

Nigel Barker,
Weston-super-Mare, Avon.

Continental QL

I READ with some interest the letter from your correspondent, M G. W. Feler of Paris, in your January 1986 number. I have had the same experience with low mains voltage here. All my equipment was purchased in England, with the exception of a Silver Reed EXP 500 printer, because of the ludicrous prices charged in this country for computers and ancillaries.

I use a QL expanded to 640K, with a C.S.T. dual 3.5in. floppy system. To get correct operation, I have boosted the line voltage (nominally 220, more usually 215), to 240, with an auto_transformer, though evidently a voltage regulating transformer would be preferable. This has stopped problems with corruption of data, etc.

The addition of the disc drives and the extra memory transforms the computer and turns it into a serious professional machine which it is not with 128K and the microdrives. I must say that mine has always worked impeccably and I consider it a vast advance over the warmed over Z-80 type stuff which seems, nevertheless to be so popular.

I believe Sinclair is bringing out a new machine. What is needed is 640K as standard, suppression of the Microdrives, except perhaps as a cheap separate add on instead of discs, and access to MS DOS as Apple has done with the Macintosh. Sinclair should also improve its marketing. Amstrad sells its machines here under the name "Schneider", which sounds serious. Perhaps Sir Clive should call his machines for export "Sündeklar".

F. Gutteridge,
Geneva, Switzerland.

On The Air

J. COOPER wrote in the January issue of *QL User* about the possibility of transmitting QL programs over the airwaves. All it needs to do this is a circuit to convert the QL's serial port output to an audible tone at a frequency dependent on the level at the port. The tone can then be transmitted, received, and finally fed back into the other QL's serial port.

Such a circuit is in fact commonly referred to as a modem, and for the home constructor several designs have been published, for example:

Acoustic Modem by Jonathan Burchell, *Radio & Electronics World,* February 1983, pages 10 to 13, *Acoustically Coupled Telephone Modem* by Kenneth Amor, *Practical Electronics,* February 1980, pages 39 to 44.

Both of these modems are intended for acoustic coupling to the telephone line via a loudspeaker and microphone. To adapt them for radio it should only be necessary to substitute the transmitter input for the loudspeaker and the receiver's output for the microphone. The above designs are for 300 baud operation, so the QL's serial port would need to be set up for this. Programs could be transmitted by a command such as SAVE ser1 with the receiving QL set for LOAD ser1.

Finally I would like to endorse G. Slatter's comments on the Centronics GLP printer — it really is a "Great Little Printer" and excellent value for money.

R. Wilson,
Cirencester, Gloucs.

Expanded Accounts

YOUR correspondent Mr. A. Viney who is having trouble with running Sagesoft Integrated Accounts on his QL appears to have been misinformed by Sagesoft.

I purchased Sagesoft Integrated Accounts in October 1985 which ran very satisfactorily on my unexpanded JS ROM machine. I have subsequently converted it to run on a single drive disc system — an Opus single drive via a Technology Research unexpanded interface.

However, because I also needed to run the program at home I purchased another QL, this time with a JM ROM. Result — nothing! Sinclair Research kindly updated the ROM without charge to a JS and again everything is in order. My only criticism is the 15 to 20 minutes required to make back-up copies on microdrive.

I therefore suggest Mr. Viney's problem is not in the expansion or disc drive but with the ROM version — possibly JM? A colleague has also confirmed that his AH machine runs Sagesoft's Integrated Accounts.

I hope that this is of assistance to Mr. Viney and your other readers.

G. H. Bent,
Corby, Northants.

Editor's reply: The most recent version of QL Integrated Accounts — V1.21 — incorporates a start-up routine which enables it to be used with most of the floppy disc systems available for the QL. We spoke to Sagesoft, who were unable to confirm that Integrated Accounts would run on version JM ROM machines. If any other readers have had problems with the Integrated Accounts package, please write and inform us.

Fast Drives

CONGRATULATIONS on a magazine that is improving tremendously every issue.

Michael Rouse's letter in the January edition finally solved a problem I have had with Quill since day one, in that I had to keep switching my Epson FX80 printer off and on to get the last line out of the buffer.

I find one drawback with QUILL and 'what you see is what you get' is where draft copies are required, before final print-out in bold or elite/double-strike. It is awfully slow to go back over a long document using F4 Paint.

My solution is to set up a printer driver, accessed through LRUN MDV1_INSTALL_BAS, which gives me the best mix of embedded and non-print codes along the top line of keys. This easily allows an explanatory strip to be put across the top of the QL as a reminder.

Best wishes to you all for the future, but how about the following resolutions?

1. Try to avoid 'games programs'. Most USERS bought their QLs for serious applications and non-machine code programs are a waste of time anyway.

2. Much more usefully, publish applications for the bundled software programs rather than concentrating on SuperBasic. These would also adapt to the ICL OPD/Merlin Tonto and you should widen your readership base quite considerably.

3. Finally, do keep the Microdrive exchange up-to-date, I am desperate to get my hands on the File Recovery Program in January but despite promises in the text

there is no mention of cost in the relevant section.

A. Taylor,
Bristol.

Editor's reply: QL owners have a diverse range of interests from games through to programming and serious business applications. We try to mirror this diversity in *Sinclair QL World* by including articles of interest to everyone. Hence, as well as the odd games feature you will continue to find numerous articles aimed at the business user, such as last month's software applications feature on the Psion packages.

The Microdrive Exchange has, regrettably, suffered a few bottlenecks as a result of our change of offices. Hopefully, by the time you read this things will be back to normal.

QL Mk 2?

I MUST ADMIT I am surprised that the QL has not reached a larger market than it has to date. I tend to believe that it is thought to be too sophisticated by the home computer buff and not sophisticated enough for business. The gap between the two spheres of operation is too wide for any one machine. It's potential must lie more in the business mode, and after using one now for some 18 months I think the following improvements for a Mk 2 version might prove very popular:

1. No doubt at all about getting rid of the Microdrives, — I could be very rude here, but its not fitting for a magazine — and fit a 1 meg. 3.5in. disc in the right hand side, with an external socket for a second drive. Add required commands to SuperBasic.
2. Permanently fit 512K of external RAM as standard — external for the best speed.
3. Put the Psion suit into ROM with the facility to multi-task, so that for instance, I can check for details in Archive if I am half way through writing a letter with Quill, without losing my place, or having to save the letter for future attention.
4. Internal parallel printer interface.
5. 85 column ability colour monitor.
6. Power supply built into the monitor.
7. Mains spike suppression built in.

At the moment I have 640K memory, twin 1 meg. drives, Sanyo monitor and CP 80 printer. My only grumble is that no-one seems able to produce a reliable Q+2 interface, they all seem to cause intermittent 'lock up'. Other than that the system is excellent and worth far more praise than the press seem willing to give it.

Tim Fuller,
Southampton, Hants.

Printing On The Cheap

HAVING recently bought a cheap printer I was quite pleased with how easy it eventually was to connect it to the QL running QUILL, even though the CGP-115 graphics/text printer was supplied without manual or connection details.

The printer performs quite well in normal (large) print mode, the characters are not by any means perfect, but are very legible. (Don't try using the small print option unless you own a magnifying glass!) Other features must be available, but I have not found them yet! Perhaps another CGP-115 user could pass this information on to me? Printing times leave a lot to be desired, but at a cost £59, who can complain?

I connected it to SER2 using an RS232 lead which was purchased by mail order for £7.50. After tracing it through with a meter (no information with this either), I eventually figured out which pins correspond to which signals:

25-way male D-type

PIN	*SIGNAL*
2	*TX (from QL)*
3	*RX (to QL)*
5	*CTS*
6	*+12v*
7	*GND*
20	*DTR*

The following printer information was deduced alfter another few minutes:

4-way DIN

PIN	*SIGNAL*
1	*NC?*
2	*CTS*
3	*GND*
4	*TX (from QL)*

The printer receives serial information at 600 baud, with even parity. The CTS signal is required by the QL since the printer carriage return time is quite large, about three seconds, which is enough time to loose several characters.

Apart from the graphics functions which I haven't found yet, I wonder if it will change pen colour while printing?

P. Johnson,
Stoke-on-Trent, Staffs.

Editor's reply: If any readers with a CGP printer can provide more information we would be glad to hear from you.

More Printer Problems

HAVING successfully interfaced a Sinclair Spectrum with a Tandy DMP-105 matrix dot printer, I was dismayed to find problems in using the same printer with my new QL.

When listing a program to the printer; the first line prints correctly, but subsequent lines have the first digit of the line number missing. The listing ends with an "X", which the DMP-105 prints when it receives a code outside the character set and is not a control code. When used with any of the Psion programs the same problem occurs, unless the margin is inset, in which case occasional lines are inset an additional character position.

The QL would appear to be sending an extraneous code after sending CR (Code 13), which causes the printer to ignore the next character code. But why?

The DMP-105 has both serial and parallel connections and I have been using SER1 with the same pin assignment as used with the Spectrum Interface 1, as follows:

QL	*DMP-105 (4 pin DIN jack plug)*
RxD	*to (4) DATA*
DTR	*to (2) BUSY*
GND	*to (3) GND (0V)*

The instructions I have used are:

OPEN #3, serc	*Default to SER1 with non-parity and handshake*
	Change ASCII code 10 to code 13
	Printer defaults to CR=CR+LF
BAUD 2400	*Printer can be set to either 600 or 2400 baud*
LIST #3	
CLOSE #3	

Could the problem be solved by using a parallel interface, or must I accept the possibility that the QL and DMP-105 are incompatible?

There appears to be no way to make multiple copies and printing one copy is fairly tortuous!

Press F3	*for command mode*
Press P	*for printing option*
Press ENTER	*to accept default option-current document*
Press ENTER	*to accept default option-whole document*
Press ENTER	*to accept default option-to printer*

Then several seconds further delay, while printer data is found and loaded.

I often have the need to print 20 to 30 copies of reports, and I have been using Tasword Two to do this. Although Tasword was not designed with automatic paging for continuous paper, or with multi-copying facilities, it was a simple matter to introduce these facilities in the basic control section. Is there a way of introducing multi-copying into Quill?

Derek Coverdale,
Ipswich, Suffolk.

Programmers Take Note

I FIND typing in other people's programs a very tedious process, it is made doubly worse if there are many DATA statements. Worst of all perhaps are those where the data can be generated by many fewer lines of program — with far less risk of error. *QL User* for January has a good example on pages 27-29, and as if to prove my point there is an error in the DATA statements!

The following short program will generate lines 470-532, which can later be merged with the main body of the program; lines 527-579 can be treated similarly.

May I press you to ask your contributors to consider this point; to ignore it is, in my view, poor programming and an insult to your readers.

Mr. J. B. Russell,
Rainham, Kent.

```
100 DIM a$(3,4),a%(3) : OPEN_NEW  4, adv2_dat_gen
110 a%(0)=0 : a%(1)=0 : a%(2)=0 : a%(3)=1
120 FOR i  = 470 TO 523
130 i%=i
140 FOR j = 0 TO 3
150 a$(j)=a%(j) : a$(j)=FILL$("0",4-LEN(a$(j)))&a$(j)
160 END FOR j
170 PRINT  4,i%;" DATA "&CHR$(34)&a$(0)&a$(1)&a$(2)&a$(3)&CHR$(34)
180 IF i = 523 THEN EXIT i
190 FOR j = 0 TO 3 : a%(j)=2*a%(j)
200 FOR j = 3 TO 0 STEP -1
210 IF a%(j)>9999 THEN a%(j)=a%(j)-10000 : a%(j-1)=a%(j-1)+1
220 END FOR j
230 END FOR i
240 CLOSE  4
```

®REVIEW BASIC ALTERNATIVES: APL

In the first of our regular series on alternative languages to SuperBasic Charles Gerrard reviews QL APL.

SuperBasic on the QL is a generally useful language, well structured, with a wide variety of commands. Now, with the addition of a compiler, even the slow speed of SuperBasic can be avoided. SuperBasic, though one of the best BASIC implementations available for a home micro, is often just not good enough. Many people find themselves looking to other sources for their specific needs. They will normally be the more common languages, such as Pascal, C and Fortran. There is, however, a wide range of more exotic languages now available for the QL. In the next few months, we will be introducing those languages in a series of articles.

The first will be introducing the much-maligned language Lisp, with special reference to the excellent Metacomco Lisp package. To introduce the series we look at an even more unusual language.

Though getting a little long in the tooth, having been around since the 1960s, APL — A Programming Language — has a small but loyal following.

Generally found on only large systems, the APL package for the QL is probably one of the cheapest implementations available.

Designed as a mathematical language, APL is very different from the more traditional languages found on many home micros, such as Pascal and BASIC. With the ability to handle complex data structure operations with single instructions, APL is often very confusing to the beginner but has great advantages once it has been mastered. In addition, until now APL has used a symbolic notation containing a wide variety of unusual Greek symbols, which have tended to intimidate new users. The QL/APL version has expanded all those symbols into a set of keywords, making the language, at least in appearance, much more like BASIC.

On power-up, with the cartridge in place, "QL/APL Keyword Version 1.03" is displayed. Having booted the APL cartridge, you are informed that 28K of workspace is available. Not a great deal, even if a portion of the interpreter is on ROM, so serious use will probably require QL memory expansion. You are now in the APL environment. Rather than defining independent input and output windows, as are normally found, all input is shown in red and output in green, though those colours can easily be changed if you have a monochrome TV or monitor.

The interaction with Qdos will also allow you to define different windows easily for calculator input/output and program input/output or any other processes you may be running. Though the system allows for only five user channels, such channels as the printers — ser1 and ser2 — are defined previously, through the system function #HC (Hard Copy), so there should be no difficulty with that.

APL is a highly-structured language, making good use of function libraries and multi-dimensional data structures. For instance, to add a number to a list of numbers, you would type: *6+1 3 5 7 9* which would produce the list: *7 9 11 13 15* by adding six to all the elements. Any of the data structures can be given an identifier, much the same as a variable has an identifier in SuperBasic, so you would not normally find that kind of rather simplistic example.

Because of that structure, standard APL requires two types of minus sign, one for negation of a number — known as the high-minus or negative marker — and one for subtraction. As explained in the documentation, that is not possible in the keyword version and a different syntax applies. A minus sign followed by a space will be interpreted as subtraction. That can make spacing very important, which is not normally a problem using the standard version of the language.

When developing a program, QL/APL uses the standard QL editing key combinations, though alternative word processing packages may be available when the proposed package for integration with files from other sources appears. On the whole, error messages are informative, and a #TRACE function is included for those elusive bugs.

It probably will not be long before you encounter a fundamental difficulty with using the language. There is no facility to interact or switch between APL and SuperBasic. That means when you want to save your first program, you should have a formatted cartridge ready, because you will not be able to format it from APL. That can be a major handicap if you find, for instance, that you have run out of storage space on the cartridge you are using.

In addition to most of the standard APL features, QL/APL also includes a number of additional functions. One is #CC (Console Control) which allows integration with the Qdos operating system for windowing, borders, screen modes and colours, filling, lines, circles, and so on. That command also allows access to the keyboard and sound control. One or two quirks appear, such as having to type: *X is #CC 0 10 20* instead of just: *#CC 0 10 20* to position the cursor. The second statement throws an automatic line feed, positioning the cursor at 11,20. There are a few quirks like that but you tend to become accustomed to them fairly quickly, and even traditional QPLers should have no difficulty adapting to the keyword system, given time.

In most cases, where the QL has a particular APL character available, QL/APL uses it, or its logical alternative. So, addition, multiplication and division use the normal symbols '+', '*' and '/'. For some reason, however, a number of the APL symbols which are available on the QL have been changed in the keyword version. For instance, rather than using square brackets, [], MicroAPL has chosen to use angled brackets <>. There seems to be no obvious reason for this. In fact, the square brackets, being unshifted, are probably easier to use. The '=' sign has also been changed to 'eq', though that is possibly to make it consistent with the other relational keywords.

One very obvious area for improvement is the filing system interface. At present, files are accessed by numbers rather than names. MicroAPL says it has no immediate intention of producing such a software interface but it mentioned a filing utility which will soon be released, allowing APL users to access files from other sources, such as Quill and Archive.

The use of keywords will not be very appealing to experienced APL users but will mean more to beginners and encourage them to use the language. One problem with this method is that APL program lines, which are often long and complex in the symbolic version of the language, will be even longer in the keyword version, making the new more verbose structure even more difficult to read. Also, with the single minus sign and the 47 keyword primitives, which cannot be used for user-defined functions, conversion to the QL from other APL interpreters could pose problems for anybody not fully conversant with both versions of the language.

The MicroAPL choice of keywords does not seem to be very standard. It has adopted a more meaningful Basic approach rather than just converting the Greek symbols to their respective words. That is probably the best approach but makes conversion a little more difficult. Having said that, QL/APL keyword programs should still run on standard APL packages because of the keyword translator which is included in the interpreter. It converts keywords into the standard APL 68000 codes on input, converting them back to keywords on output. Consequently there should be no difficulty when transferring programs between the two QL/APL packages.

There are two features which are not implemented on the QL/APL system for space-saving reasons. QuadFMT (or #FMT) is a formatting system function which has not been included but I have never encountered it, so it is no great loss.)GROUP and its associated functions have not been implemented. That is a pity; though the command is really only a nicety for grouping functions.

The documentation consists of a hefty but well-written, tome, designed both for beginners and advanced users. It is written in four sections; section one shows how to load and run APL and section two gives a very easy-to-follow beginners' guide, with examples. Section three is a complete description of the language, which is useful to APL programmers and beginners, showing the keywords used. Section four contains useful reference information, including an invaluable Keyword-to-APL table and a summary of all the system functions and variables and their uses.

Available from MicroAPL Ltd, the new keyword version of QL/APL costs £99.95 for which you receive a ROM cartridge containing about 30K of the interpreter, a Microdrive cartridge from which you are advised to make a working copy, and a detailed manual covering most aspects of the language for the advanced user and beginner.

In addition, a standard QL/APL version is available, with all the associated symbols, for £129.99. It arrives with a separate card detailing the use of the standard keyboard to obtain the symbol graphics. One noticeable black mark is that MicroAPL has no telephone enquiry service if you have problems. That suggests that the package is definitely aimed at the home user rather than the professional APL programmer.

It is unfortunate that the QL is unable to handle both the symbolic and keyword versions simultaneously, which would allow new users direct comparison between the two versions. Any serious users who think they can handle it, and who are willing to pay £30 extra, would probably be best-advised to buy the symbolic version, especially as there is a chance that they may use other APL implementations in the future. That, however, may create a problem when requring hard copy output, because there are, as yet, no printer drivers available.

Both versions of the language are well worth considering. These professional products make the QL an attractive buy as the cheapest APL system available. The clever yet simple step of producing a keyword version of this cult language should create many new users and die-hard followers.

QL/APL - Specification

* Special keyword version runs on standard QL keyboard
* Compatible with IBM mainframe APL
* All standard APL facilities implemented, with no restrictions
* Variables up to 8 dimensions
* No object size limit other than available memory
* High precision floating-point routines accurate to over 15 digits
* Error Trapping under program control
* Commercial 'picture' formatter makes report generation easy
* Multiple statements on a line
* Wide range of system functions (string search, matrix-vector conversion, etc)
* Professional component filing system
* Overlays (functions and variables may be combined into packages)
* System commands may be executed
* Built-in colour screen handling, window support, colour graphics
* Printer control and redirection of output

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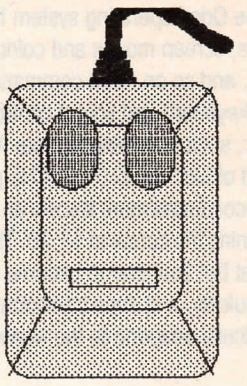

Mouse

for the SINCLAIR QL

The Giga Soft Mouse comes in a ready-to-use package including a high quality mouse (resolution 0.01″), an interface for the joystickport of the QL and a software package.

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Giga – Basic **(Tested in QL USER 1/86 p. 58)**

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QL COMMS

Our resident expert Tony Dennis brings you up to date on the latest from the communications world.

BROWSING through Micronet's news pages turned up an interesting item on something called Citadel. Apparently Citadel is the name for a slightly usual kind of bulletin board dedicated entirely to QL users. The host software for Citadel owes its origins more to adventure game software — like Dungeons & Dragons — than it does to a purpose designed bulletin board.

Citadel is split into rooms instead of relying on a menu system like other boards. Despite its extravagant claims of originality it is similar to PIP in Sheffield which uses TBBS host software. Not everyone likes the idea of having to explore the system in order to find interesting items. Fortunately, like standard bulletin boards Citadel also supports private mail for communicating with other callers.

The system operator — or sysop for short — is Ken Smith of DataManagement in York. Citadel is run on a Shelton CP/M machine to which a 28MB hard disk has been attached. Ken claims that the system holds around 4MB of QL software for free downloading. Citadel can be accessed at either 300 or 1200/75 baud. It does not, however, currently support Prestel software, so a standard terminal package is needed. No prizes for guessing that DataManagement sells such a package.

Ken's reasons for running Citadel are, therefore, partly mercenary. DataManagement was responsible for writing the software for the ill-fated Brightstar modem. When that project bore no fruit, the company looked around for another modem and hit upon Thorn EMI DataTech's VX543. This is a dual standard V21/V23 modem with an internal buffer. That means no interface is needed. Communications are carried out via one of the QL's two serial ports at 1200 baud full duplex. Since the Thorn modem is not machine specific, it can be used with other micros besides the QL. DataManagement will sell the complete QL software/modem package plus Sagesoft's ChipChat IBM PC software for £340 plus VAT. That is at least £59 less than Sagesoft charges for its own complete IBM package.

DataManagement's communications package costs £231.50 including VAT. The price includes membership of Citadel, QLPrestel, QTerm, the 543 modem plus serial lead. It is considerably more expensive than the £113 exc. VAT now being charged by Tandata for its QL comms system. Both packages are compatible with bulletin boards and Prestel.

QTerm has a number of extra bells and whistles such as the ability to receive up to 60K of files using the Xmodem error correcting protocol. An upgrade, QTerm2, is planned which will contain a useful off-line text editor. QL Prestel is written in BCPL and features the ability to automatically log into Prestel, capture 10 frames and then log out again all at a preset time. The one thing it does lack is a telesoftware downloader for Micronet. This should be available later as an upgrade. DataManagement also sells a variety of other software for the QL including QL Finance Manager and QL Life.

The drawback with Citadel is that one needs to pay a subscription fee to DataManagement in order to access it. Ken Smith believes that will be set at around £25. That will, of course, keep casual callers off the board. Callers need to have a valid password as well as knowing Citadel's actual number. Users also have to pay for the cost of phoning York which is not much fun if it is not a local call. Membership of Citadel will be initially restricted to around 500 to prevent the system from becoming permanently engaged.

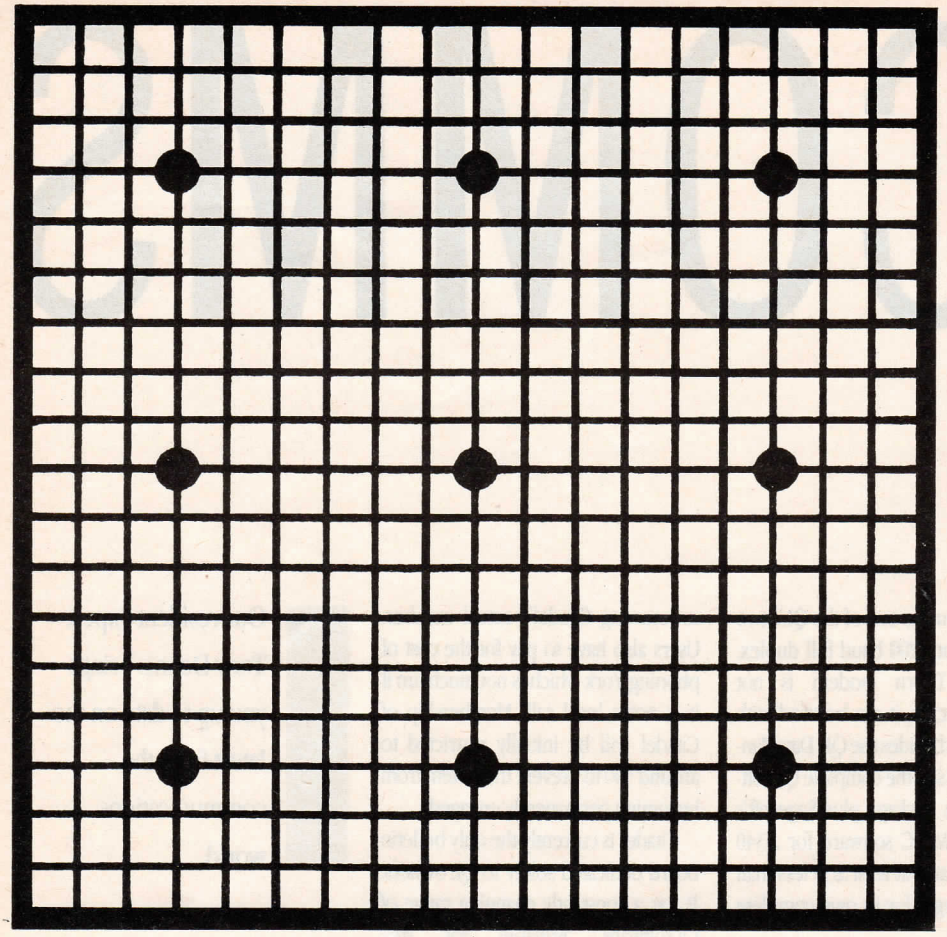
Citadel is currently the only bulletin board dedicated solely to QL owners. It has a constantly changing range of QLsoftware available for free downloading. Ken is obviously a QL freak himself with his personal machine sporting 1.6MB of floppy disc. He also puts out a two page QL newsheet.

Citadel does have some competition in the bulletin board field. Stephen Adams has set up a board aimed at Sinclair users. The host software is CBBS (R) which will be very familiar to ardent hackers. Stephen's main interest is in selling communications software for the Spectrum. He does, however, welcome QL owners. Based in London the board's number is 01 249 3238. It will cope with either 300 or 1200/75 baud calls but not with Prestel software.

Strangely enough Stephen's board also runs on a CP/M machine. Ken Smith has yet to write the software to turn the QL into a bulletin board host. In Stephen Adams case he is using a Superbrain with 720K worth of disk storage. The board operates 24 hours a day and gets a large number of calls from overseas users as well as UK enthusiasts. Unlike Citadel, Stephen makes no charge for accessing the board.

For those interested in Citadel or the comms package, DataManagement can be contacted at Clark House, Haxby, York (0904 760847).

QL GO



1

Marcus Jeffery attempts to unravel the mysteries of the oriental game GO.

For many years computer scientists have used games as models to test new programming techniques. That permits them to test their routines within a well-defined environment, rather than under the often ambiguous real-world conditions.

The major difficulty researchers of artificial intelligence face is one of complexity. Making a program play the game of Noughts-and-Crosses, which was once thought to require intelligence, is no longer a challenge. Moving to chess, that provided a significant challenge for many years. Even today, chess programs have not quite achieved world-class fame but they can easily beat the vast majority of people. A new game challenge was needed, the oriental game of *Go*.

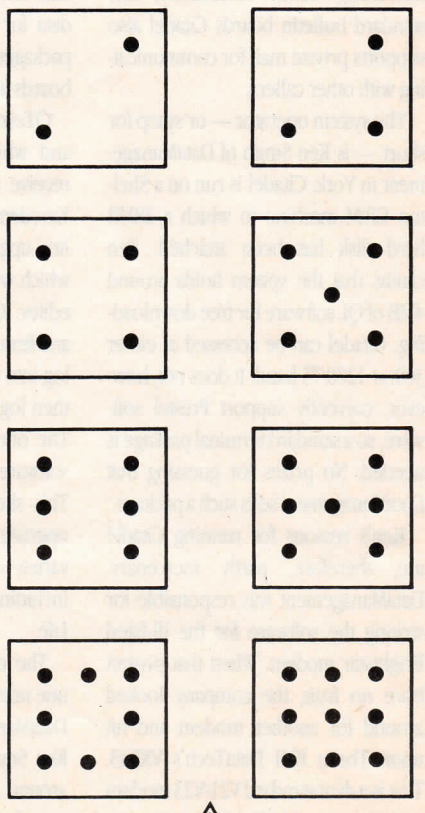
Though the rules of the game are far simpler than chess, the game is far more complex. After more than 20 years of research, the top programs still play at little better than novice level. Next month we will present a QL SuperBasic program which plays the game. Though not highly proficient, the program provides a good introduction to the game and should prove something of a challenge. The program has been designed specifically so that it is easily modified and developed.

Go is a two-player game, played on a board inscribed with a grid of 19 x 19 lines, giving 361 intersections, as shown in figure one. The two players, one playing black and the other white, play alternatively by placing one of their infinite supply of stones on to any vacant grid intersection of the board. The ultimate object of the game is to surround territory – vacant intersections – with your own stones, the winner being the player with the highest score — most territory — at the end of the game. That score is modified by capturing enemy stones during the game.

The first move of the game is played by Black, usually the weaker player. Go has an exceptional feature for board games, allowing players of differing strengths to enjoy a challenging game. If there is a significant difference between the playing strengths of the two players, Black's first move consists of placing between two and nine handicap stones on to the board. Those stones are placed in a specific pattern on to the nine points marked on the board — see figure one. Figure two shows the appropriate patterns.

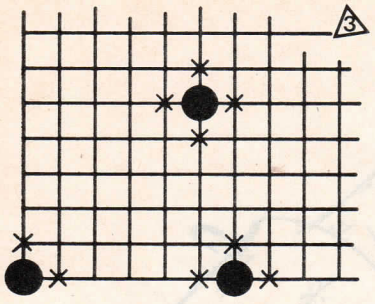
Any vacant point immediately adjacent to a stone is called a 'liberty'. Thus a single stone can have two, three or four liberties — figure three — depending on its position on the board. To capture a stone, the opponent must place his own stones on all of those liberties. Thus, in figure four, if Black's last move was to fill the last liberty of the white stone, then the stone would be removed from the board. If two or more stones are immediately adjacent to each other, horizontally or vertically, they are said to be connected to form a 'group'. Note that diagonal connections do not count, so there are three groups shown in figure five. It is not possible to capture a single stone in a group; instead, the whole group must be captured as a single unit by filling the combined liberties of all the stones — figure six. These are the rules of the game but a few complications follow:

Suicide. A player may not place a stone on the board such that, at the end of the player's move, the stone or its associated group would have no liberties. Thus, in figure seven, Black cannot play on either of the points marked '1' or '2'. Black, however, may play on point '3' because that would leave the white group with no liberties and the white stones would be removed, thus creating liberties for the black group before the end of Black's move.



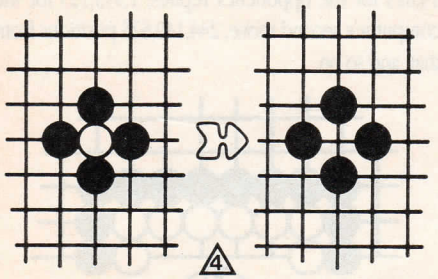
2

Handicap patterns



Liberties

Ko, meaning infinity. Ko occurs when a single stone is captured and the opponent can play immediately back on to the vacated intersection to recapture the previously-played stone and produce the prior position. If that sounds a little complex the situations shown in figure eight should help to explain things. To deal with this anomaly a special rule prohibits a player from placing a stone which would produce the 'immediately prior position' but must instead play at least one intervening move somewhere else on the board. Those intervening moves are usually played so that they threaten the opponent and demand an immediate reply — a move in 'sente' for Japanese readers. Those 'Ko threats' allow the player to re-take the Ko position — i.e., the intersection disallowed on the previous move — and compel the opponent to find a similar threat in order to continue the Ko fight.



Capture

A further problem can occur in which more complex Ko situations develop. Figure nine shows a 'triple Ko' situation.

(a) Black plays at '2', capturing the white stone on the right.

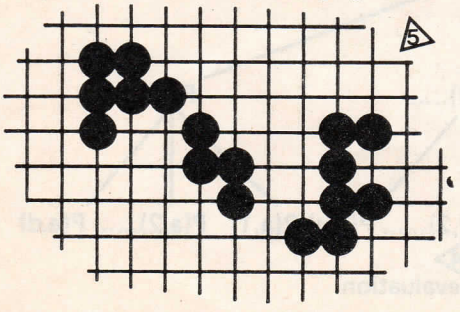
(b) White then captures the black stone just below '1'.

(c) Black captures the white stone just below position '3'.

(d) White, having played an intervening move, can play back into the position of the first capture — just to the right of '2' — removing the black stone.

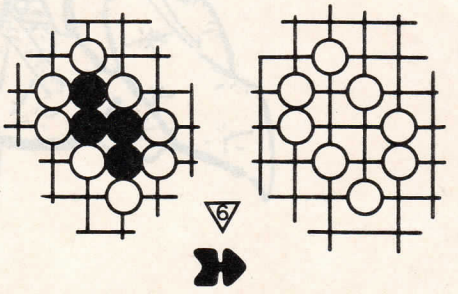
(e) Black recaptures the white stone at '1' by playing on the now vacant intersection below it, and so on.

During the normal game, if neither player is willing to give up this Ko fight, the game is cancelled. Fortunately, such situations are rare and the program which we will be developing will not be asked to deal with them. Doing so would require the computer to store all board positions during the game and check them against the current position to see if they match. If they do a Ko situation has arisen.



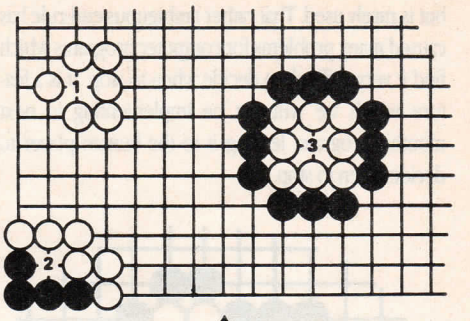
Groups

Inquisitive readers may already have pondered whether a group of stones is ever completely safe from capture by the opponent; the answer is that it is which brings to light a very important concept of the game, that of 'Life and Death' for a group of stones. A liberty which is entirely surrounded by stones of the same colour, so that it is controlled by them, is called an 'eye'. We have already met an example of this in figure seven, where the Black play at '3' kills the white group by filling the hole, or eye. You will notice that to kill this group, the eye filling move must be the last stone played. If, for instance, the white group was not surrounded by black stones, placing a stone in the eye would contradict the suicide rule.



Group capture

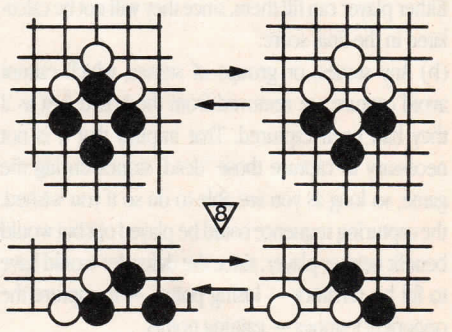
Taking the concept one stage further, imagine a group containing two eyes, such as the White group in figure 10. To capture the group, the last Black stone must fill both eyes simultaneously; that is impossible, because Black can place only one stone at a time. Consequently, this group, and any containing at least two eyes, is safe from capture and will remain on the board until the end of the game unless, of course, White is stupid enough to fill the eyes.



Suicide

It is not even necessary that the eyes be controlled in one group. The two six-stone white groups shown in figure 11 — remember diagonal connections do not count — share the two eyes, ensuring that neither group can be captured by Black.

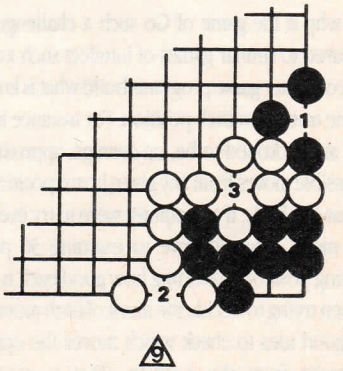
Take care, however, for although the two groups in Figure 12 appear to share the two eyes at intersections '2' and '3', Black can capture by playing the sequence of moves: '1'. '2' and '3'. The eye on the right — '2' — is known as a 'false eye'.



KO

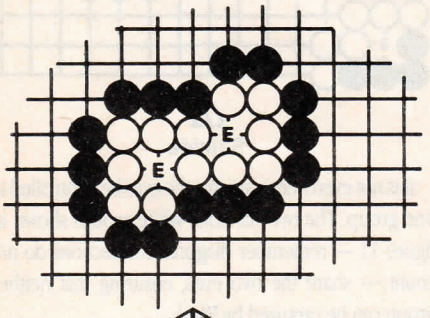
All those groups have had fully-developed eye formations but in practice it is not necessary to form two eyes for each group — merely to have the potential to do so if attacked. Thus the White group in figure 13 is safe, even though it has not formed two eyes. Whichever of the two positions Black plays into — the remaining two points are mirror images — White can place a stone to form two eyes. Experienced players would not need to go so far and might have open-looking positions which they know they can defend.

The end of the game is decided by mutual consent of the players or when both players pass. That tends to happen when neither player feels there is any advantage to be gained from continuing to play. Passing is allowed by either player at any stage during the game



Triple KO

but is rarely used. That rather ambiguous end-rule has caused many problems for computer programs which find it very difficult to decide when to stop. It is a feature which we will not be implementing in next month's program, leaving it to the human player to decide when to stop.



10

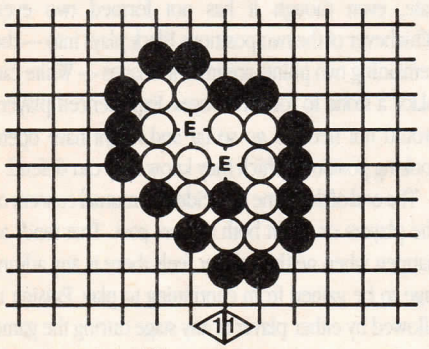
The eyes have it

At the end of the game, each player's score is calculated in the following manner:

(a) All neutral points, known as 'dame', are filled. Either player can fill them, since they will not be calculated in the final score.

(b) Any stones, or groups of stones, which cannot avoid capture are removed from the board, just as if they had been captured. That implies that it is not necessary to capture those 'dead' stones during the game, so long as you are able to do so if you wished. the capturing sequence could be played out but would benefit neither player, since the defender would have to fill his territory — losing points — to capture the opponent's stones — gaining points.

(c) Each player's score is then calculated as the number of vacant intersections controlled by the player — i.e., the player's territory — minus the number of stones captured by the opponent. The winner is the player with the most points.



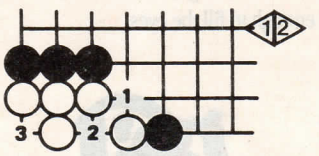
11

Shared eyes

So why is the game of Go such a challenge when compared to similar games of intellect such as chess? Most computer game programs build what is known as a 'game tree' from each position. For instance in chess there are reckoned to be, on average, approximately 30 possible moves from any given board position. Taking that as a basis, if a computer were to try every possible move it would have to examine 30 possible resulting positions, deciding how good each is.

When trying to decide the merit of each move it may be a good idea to check which moves the opponent can make from the position. That is reasonable because the opponent will have the first move from the position and it is obviously no good if the opponent can immeidately check-mate you.

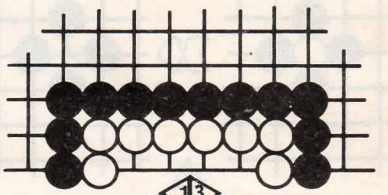
If we assume that the computer will examine all the moves which the opponent can play from the 30 positions which the computer can reach initially, we have to examine somewhere in the region of 900 (30 x 30) possible positions. Taking that a stage further, we could look at all the computer's possible replies, giving approximately 27,000 positions to be evaluated, followed by 810,000 positions at the next level, and so on. This look-ahead evaluation is shown diagramatically in figure 14, where the branches from each position node show the possible moves from that position.



12

Though the two groups appear to share two eyes, they are easily captured using the sequence shown.

Horrendous though those numbers may appear, they can be reduced somewhat using a variety of techniques, particularly the alpha-beta algorithm, and they are manageable by high-speed computers. The average number of moves available from a given position in the game of Go, on a 19 x 19 board, is estimated to be around 200. On our 15 x 15 board that number is still likely to be around 125. If we start our standard look- ahead technique, the exponential growth gives 15,625 for the opponent's replies, 1,953,125 for the computer's second move, 244,140,625 positions from that, and so on.

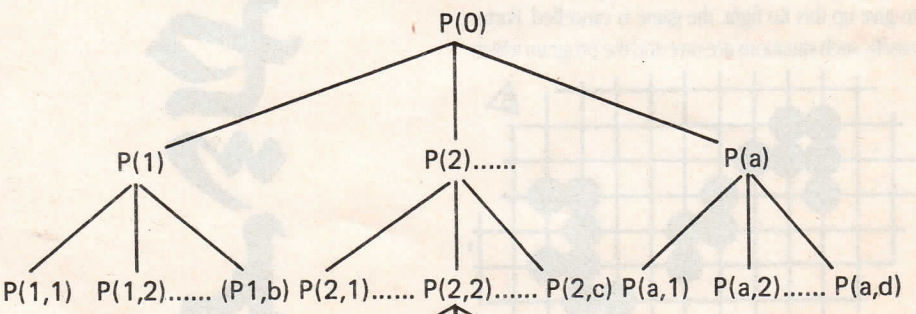


13

Eye potential

Even large mainframe computers would find that a real chore and the humble QL could not be expected to use the technique and find a move this side of Christmas. What is more, it is not unusual for Go texts to examine some moves up to 20 or 30 moves ahead to decide the outcome of a particular battle.

That demonstrates the futility of attempting to find moves in the game of Go by trying brute-force, look-ahead techniques which have been used previously. It is one of the prime reasons the game is so difficult to program. Instead, we will develop a series of routines which will examine the present board position in the hope of being able to choose some likely moves.



14

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LISP: THE LANGUAGE

Twenty five years after its invention LISP is fast becoming the popular language of Artificial Intelligence programmers. Charles Gerrard introduces our tutorial series.

Despite being one of the oldest computer languages in use, LISP has been proving popular in recent years. That is evident by its use in research and development in the growing field of Artificial Intelligence.

So, why has this archaic language been receiving so much attention? LISP is very different from the more accepted high-level languages, such as Pascal, BASIC and FORTRAN. Unlike those expression-based languages, everything in LISP is defined in terms of 'lists'. If you want to include some data, it is shown in a list format. Manipulating data is carried-out by functions, which have been defined in terms of lists and operate on lists. It is that simple and uniform syntax structure which has made LISP so exceptional among computer languages.

The uniform structure of LISP has also helped the language avoid another of the major pitfalls — compatibility and portability. As a language becomes more popular, new implementations of it arise, each designed for slightly different applications. That tends to create a wide variety of dialects, none of which is fully-compatible with other implementations of the language. To an extent that has also happened with LISP but the language is such that only the basis of it is usually defined.

Other functions are then created by the user for particular jobs. That makes the language particularly portable. If a program written with one version of the language uses functions not normally accessible in a different version, it is easy to define them. The 'list' is a fairly familiar concept in computing. For instance, if you were to type on the QL:

PRINT PEEK(999)

you get the answer 80. In this case, the number 999 is the 'pointer' and the number 80 is the 'data' accessed by the pointer. There is no reason why we should not consider the number 80 as a further pointer. Thus:

PRINT PEEK(PEEK(999))

gives the answer 96. That, in turn, might be considered either as data or yet another pointer to a further location. Considering numbers in that way we can create a list structure *(Figure one).* The major differences between a list and an array — *Figure two* — is that the list has no set length and is much more flexible.

At present, the list shown in *Figure one* is of little use, since it holds no information. Information, however, can easily be held by considering each pointer to access two consecutive locations, as shown in *Figure three.* By including that concept in our list of pointers we can create a variable length list of data — *Figure four* — but the story does not end there.

Striving for further consistency, LISP does not consider the first item of our two-location construct to be data. Instead, both locations are assumed to hold pointers — *Figure five* — so our list from *Figure four* is represented by the structure shown in *Figure six.* What advantage does that have? Well, though *Figure six* has the data pointer accessing data, since it is treated in the same way as any other pointer, there is no reason why it should not just as easily access another list — *Figure seven.* It is that flexibility which makes the list a far superior form of data structure to the array, allowing multi-dimensional constructs of variable length. With a list, it is not necessary to reserve storage for items before they are used, making memory allocation much more efficient. Also the dynamic quality of this form of structure means that the list can easily grow or shrink to meet the present requirements.

We have seen how lists are stored internally but how are they shown within the LISP syntax? Simply surrounding a group of objects with parentheses will suffice. So:

(A B C D)

defines a list of four items. The technical term for them is 'atoms' and they may consist of any type of data. Note that spaces, not commas, are used to separate atoms, unlike other high-level languages. If we consider that in terms of the internal representations

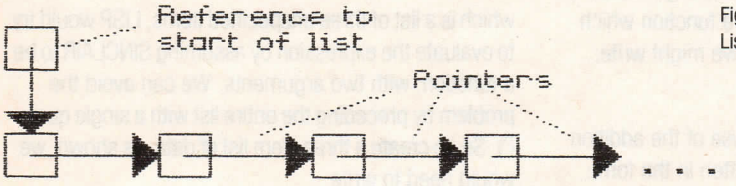


Figure One: Basic List Structure

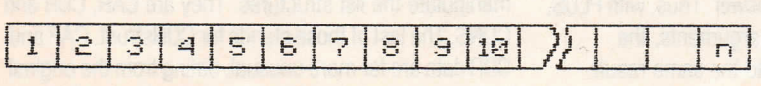
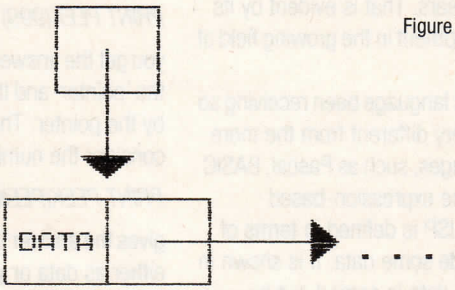


Figure Two: Array Structure

LISP: THE LANGUAGE

Consecutive locations store data.

Figure Three:



we have discussed, we immediately encounter a problem. How does LISP know where the end of the list is? In the foregoing example, we have only four items, so we must have some method of ending the list. That is done using a special list structure known as NIL. It is an empty list — ie, a list containing no items — and is used to terminate finite structures. So the internal representation of:

(A B C D)

would be as shown in *Figure eight.*

We have also examined the internal structure of a list containing lists. That is represented easily in the language by further parenthesised items. For example:

(A B (C D) (E F))

is a list containing four elements, the third and fourth elements being lists containing two elements each.

As in any other language, LISP must have a way of issuing commands to act on the list data. That is done using functions, which are written in the form:

(func A B C D E . . .)

where the first item in the list is the function name and the remaining items are the functions arguments. A simple example would be to write a function which adds a list of numbers. In BASIC, we might write:

1 + 2 + 3 + 4 + 5 + 6

whereas in LISP we would make use of the addition function, PLUS. That would be written in the form:

(PLUS 1 2 3 4 5 6)

When LISP finds that kind of construct, it will always try to execute the first item in the list, assuming it to be a function, and the remaining items will always be the function's arguments. The final value is passed to whatever may be outside the bracketed expression. In other words, you can imagine that the entire expression is replaced by the answer. Thus, with PLUS, which can take any number of arguments, the following statements would yield the same result:

(PLUS 1 2 3 (PLUS 4 5 6))
(PLUS 1 2 (PLUS 3 4) 5 6)
(PLUS 1 (PLUS 2 (PLUS 3 (PLUS 4 (PLUS 5 6)))))

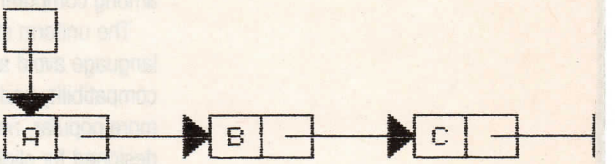
In many cases, the result of a function will be passed on to more complex calculations. As in BASIC, we can assign the result to a variable. Retaining the consistent structure, that is again performed by a function. In this case, the function SETQ. So, the BASIC expression:

LET X = 1 + 2 + 3 + 4 + 5 + 6

would be written as:

(SETQ X (PLUS 1 2 3 4 5 6))

Figure Four: A data list



As you can see, SETQ expects two arguments, the first of which is a variable, while the second can be any legal construct producing a result. LISP makes no distinction between integer, real and character variables, so 'X' need not only be assigned results from, say, arithmetic operations, but could just as easily be assigned character data, or even lists.

One difficulty which you may of noticed is that a list must start with a function, because LISP always tries to execute the first element. That could cause difficulties if all we wanted to do was to create a list of data. For instance, if we were to write the list:

(SINCLAIR QL WORLD)

which is a list of three unspecified items, LISP would try to evaluate the expression by assuming SINCLAIR to be a function, with two arguments. We can avoid the problem by preceding the entire list with a single quote ('). So, to create a three-item list of data, as shown, we would need to write:

' (SINCLAIR QL WORLD)

Variables can be of any type, so we could easily assign the above list to a variable with:

(SETQ X ' (SINCLAIR QL WORLD))

There are three primitive functions, found in all implementations of LISP, which are necessary to manipulate the list structures. They are CAR, CDR and CONS. The last of those stands for CONstruct. CAR and CDR data are far more unusual, dating from the original

LISP: THE LANGUAGE

implementation of the language. They are acronyms for Contents of Address Register and Contents of Decrement register respectively.

CAR and CDR are used to split list components. Taking a single list argument, which must have at least one element — ie, not the empty list, NIL — they are complementary to each other. The function CAR returns as its result the first element of its list argument. Conversely, CDR will remove the first element from its list argument, returning the remainder of the list as its result. So:

(CAR ' (A B C D E))

would give the answer 'A'. The first item, returned by CAR, could be an atom that is not necessarily the case. There is no reason why CAR should not return a list as its result. Thus:

(CAR ' ((A B) (C D) E))

would return the list (A B).
If we were to use CDR on the same two lists, we would get everything but the CAR element. So:

(CDR ' (A B C D E))

gives the list:

(B C D E)

and

Use of consecutive pointers.

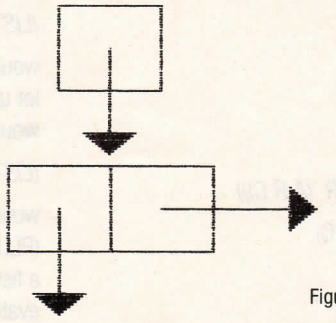


Figure Five:

(CDR ' ((A B) (C D) E))

would return the result

((C D) E)

which is a two-element list, the first element of which is a list with two elements.
It is important to note that CAR and CDR do not change their list arguments physically but return a pointer to the appropriate data structure. Thus, if we assign a list of five elements to the variable X:

(SETQ X ' (A B C D E))

then find the first element, with

(CAR X)

the list X would not have changed, still having its original five elements, but

(SETQ X (CDR X))

would change the list, throwing away the first element (A) of the list, then re-assigning it.

That is satisfactory for splitting list structures but we also need a command to build list structures. That is CONS which requires two arguments which it will concatenate into a single list, returning this list as its result. So, the command:

(CONS 'A '(B C D E))

would return the complete list (A B C D E). Again, there is not reason why the first argument of CONS should not be a list, rather than a single atom. Thus:

(CONS '(A B) '(C D E))

would return the four-element list ((A B) C D E). Take care here, because CONS did not produce the list (A B C D E) as might have been expected. Each use of CONS will always add a single element to the start of a list structure. If that element is a list, the first element of the result will also be a list. To get the latter list we would have had to use something like:

(CONS 'A (CONS 'B '(C D E))

where the nested calls give the required result.
It is common to find these instructions nested, so

(CDR '((A B) (C D) E))

will return ((C D) E), and

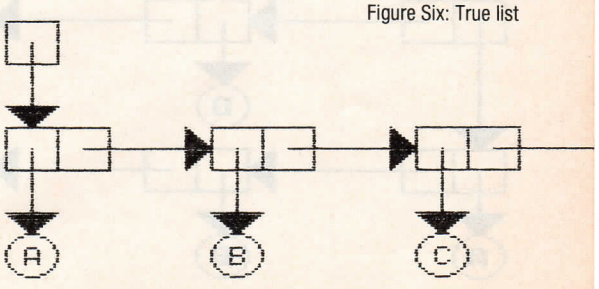
(CAR (CDR '((A B) (C D) E)))

will give (C D), which is (CAR '((C D) E)), then

(CAR (CAR (CDR '((A B) (C D) E))))

will produce "C", which is (CAR '(C D)).
That can soon become tedious and the ever-prolific

Figure Six: True list



LISP: THE LANGUAGE

brackets are already becoming confusing. Fortunately, most LISP implementations allow abbreviations of them. The abbreviated functions still begin with a 'C' and end with an 'R' but can have any combination of 'A's and 'D's in between. There will usually be a limit on them and on most micros — including the Metacomco package for the QL — the limit is set to three. So, the command:

(CAADR '((A B) (C D) E))

would give the same result as the previous example.

It can often take a time to become proficient with these functions. One easy method of visualising exactly what is happening is to imagine the list diagrams. From *Figure four,* the CAR gives the left-hand pointer and CDR the right-hand pointer of the two-location element. Try using this method with the list diagrams in *Figures seven* and *eight,* where:

(CAR '((A B C) D E)) gives (A B C)
(CDR '((A B C) D E)) gives (D E)

and

(CAR '(A B C D)) gives A
(CDR '(A B C D)) gives (B C D)

The CONS function can be viewed as CONStructing a new node, such as the one in *Figure five,* and assigning the CAR and CDR pointers to its two arguments. That is obviously correct once you realise that:

(CAR (CONS P Q)) is P

and

(CDR (CONS P Q)) is Q

thus,

(CONS (CAR '(A B C)) (CDR '(A B C)))

gives the original list (A B C).

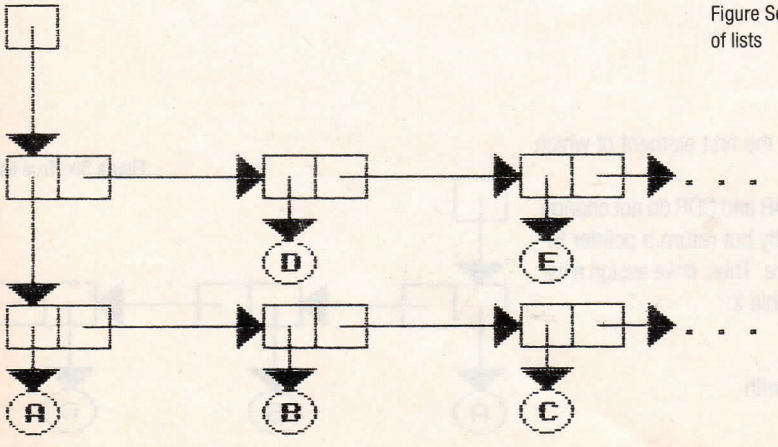
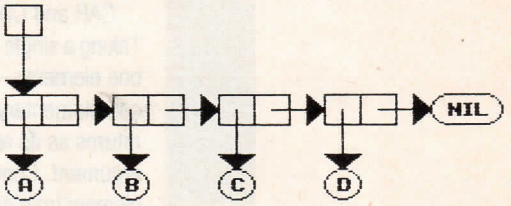


Figure Seven: Lists of lists

Figure Eight: Terminating list



Building lists from scratch using CONS can be a long job, requiring nested calls, such as:

(CONS 'A (CONS 'B (CONS 'C (CONS . . .))))

to build the list (A B C . . .), with each call adding a single element to the front of the list. Fortunately, LISP offers an alternative, with the function LIST. LIST can take any number of arguments and works by evaluating each argument and returning the result in the form of a list. So:

(LIST 'A 'B 'C 'D 'E)

would produce the list of characters (A B C D E). You should be very careful when using quotes in a list function, remembering that it evaluates its arguments. So:

(LIST A B 'C 'D 'E)

would expect "A" and "B" to be variables. For instance, let us say that A=22 and B=33. Then the foregoing would give the list (22 33 C D E). Similarly:

(LIST 1 2 3 '(PLUS 2 2))

would give the result (1 2 3 (PLUS 2 2)), regarding the (PLUS 2 2) as the final element of the original list, itself a list of three elements, none of which should be evaluated, because the entire list was preceded by a quotation, but

(LIST 1 2 3 (PLUS 2 2))

would return the more likely result (1 2 3 4), by evaluating the (PLUS 2 2).

We have now covered all the major ground work of LISP but being very different from conventional languages, it may be difficult to realise how it could ever be used effectively. In the next instalment, we will look at how LISP allows you to define your own functions. They are the basis of all programs. We will also look at how to implement conditions — much as IF . . THEN . . ELSE in BASIC — and the principles of recursion, which are often used in the language.

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PUZZLE PAGE

Marcus Jeffery provides the elusive solution to January's brain teaser and poses another cryptic problem to try your patience.

The 3^i7^j series puzzle from the January, 1986 issue seems to have created plenty of interest. The problem was to generate the series of numbers in the series 3^i7^j, starting 1, 3, 7, 9, 21, . . . Having found a method of doing it, you had to generate the 1,500th term, then sum all the digits in that number for the final solution.

1	7	49	343
3	21	147	1029
9	63	441	3087
27	189	1323	9261
81	567	3969	27783
243	1701	11907	83349

Figure One. Look-up table.

Very few people were caught by the 'red herring' program generated. Norman Hilton reckoned that the 'REPeat divide' loop would be executed nearly $5*10^{32}$ times, taking more than 10^{20} years to run, which he felt might miss the January 31 deadline. Martin Harris also appreciated the humour, which did not fool him. Instead, he had a good laugh contemplating the number of universes which might come and go whilst the QL was solving the problem.

Unable to find any expression which would produce the series, many people adopted the sledgehammer tactics of producing an unordered file of as many numbers as possible. Having done that, a number of sorting algorithms were used — including the quicksort from *QL User*, August, 1985. So long as sufficient numbers were generated originally, that gave the answer to the 1,500th term.

It is at this point that the second problem occurred — how to total all the digits. It may sound easy but unfortunately the answer contains 35 digits, just a little beyond the accuracy of the QL. Therefore it was necessary to write your own arithmetic routines to work on large integer numbers.

The most common method was to use arrays to represent the numbers, so that each element of the array would show part of the number, say three digits, and the next element would show the carry from that, and so on. Alternatively, some people preferred to use strings to represent the long integers, using the QL built-in coercion to convert each string character into a number for the multiplication routine. The advantage of the first method is that storage can be reduced; the latter method, however, is more elegant and makes the large numbers slightly easier to print.

There are a number of ways to solve the problem, other than generating a huge file, then sorting it. Based round the table layout — *Figure one* — many people turned to logarithms to find the solution. Derek Fairburn describes that neatly, though the non-mathematicians may like to skip the next bit.

Recognising that 7^j is 3^{k*j} where 'k' is 7/log 3, 3^i7^j can be written as $3^{(i+k*j)}$. Since p^y always increases as 'y' increases, for any constant 'p', then 3^i7^j increases in the same way as i+k*j. Therefore it is necessary only to find the 1,500th term in the series of values 'a=i+k*j'. That can be computed fairly easily but encounters the problem of accuracy. It is necessary to find an approximation for 'k' which is close enough to ensure that 'a' has a unique value for every pair of 'i' and 'j' values involved. It seems that a value of k=1.7712 gives a unique 'a' for i<=1107 and j<=625, which is well beyond the 1,500th term in the series. Having written a program to find the 1,500th element, the only remaining problem was to print that number.

Figure two shows a SuperBasic program which will generate the series of numbers, printing each number. It works from *Figure one,* by holding a large array of values for powers of seven (up to 7^{40}. At each iteration of the main loop, the floating point form of this array (fl_sevens) is searched for the next smallest value, which will be the next term in the series, assuming that the array is large enough. That value is printed, then multiplied by three, to give another unique value further in the series of numbers.

So, in conclusion, the correct answer is '144', which is obtained from adding the digits in the number:
131482922056772379437140741628800 83

I would like to thank John Cook for his very detailed analysis of the problem. He would also like to point out that the sum of the digits in the 400,000th term is 2,511, which was solved by his program in two-and-a-half hours. Now there is something for you to work on.

This month's winner however is J. W. Bray of Harrogate, North Yorkshire who receives a year's free subscription.

```
HPY PESE RQUYMKGSH EW EXGJNV
BNET VKI XZHVMKCP DZ BYTJH
BVRB ?
```

Figure Three. Encrypted question.

On with this month's teaser. A few days ago I was sitting in front of my QL, waiting for it to find the answer to life, the universe and everything, musing over what question to ask. I typed-in the question and was about to print it out when I noticed it had changed. The QL, in its wisdom, had decided to execute a small encryption program on which I had been working and the question was then rather garbled, as you will see from *Figure three.*

Normally it would have been no problem but I could not remember the question. Fortunately, I still had the original encryption program, given in *Figure four.* You guessed it — the program had encrypted itself.

Well, that's life. Try as I might, I could not remember the original question. Knowing how intelligent the average QL user is, I am sure you will be able to work out the answer.

```
100 OQGQ_MS#3.SKD1_MKEM_SWAU
110 FXYMZP = 0
120 OCOEBV FSIKSWXZ
130 TR RCU(#3) JYWG YSEQ ANDFNRSU
140 OUXDD#3,NTNF
150 XV TZTL>96 VJA AGAS<123 VKIS IOIA=MSME-32
160 WU SYSK>64 UIZ ZFZR<91 UJHR
170 HNHZ = LRLD + BTUIVL
180 KYKAXR QAOIH
190 MK IOIA<91 DSQA SMYK JTHBA
200 ZFZR = DJDV - 26
210 JTK ZNZPMG FPDXW
220 ILDJQ AGR$(DJDV);
230 TLMAND = ZRSGTJ + 1
240 VDLY
250 KNFLS CIT$(FLFX);
260 LVM SQ
270 QAR GUGWTN XKACKOPR
280 FPTYL#3
```

```
100 REMark QL USER 3i7j Solution
110 REMark (c) M. C. Jeffery
120 :
130 DIM sevens%(40,15),fl_sevens(40)
140 DIM d$(5)
150 d$="00000"
160 initialise_sevens
170 :
180 count = 1
190 number = 1500
200 :
210 REPeat next_digit
220   lowest = 1E99
230   FOR best = 0 TO 40
240     IF lowest>fl_sevens(best) THEN
250       lowest = fl_sevens(best)
260       element = best
270     END IF
280        END FOR best
290        long_print element
300        long_multiply element,3
310        fl_sevens (element) = 3 * fl_sevens (element)
320        count = count + 1
330        IF count > number THEN EXIT next_digit
340 END REPeat next_digit
350 :
360 DEFine PROCedure initialise_sevens
370 FOR power = 0 TO 40
380   FOR units = 0 TO 15
390     sevens%(power,units) = 0
400   END FOR units
410 END FOR power
420 sevens%(0,0) = 1
430 fl_sevens(0) = 1
440 FOR power = 1 TO 40
450   FOR units = 0 TO 15
460   sevens%(power,units)=sevens%(power-1,units)
470   END FOR units
480   long_multiply power,7
490   fl_sevens(power) = 7 * fl_sevens(power-1)
500 END FOR power
510 END DEFine initialise_sevens
520 :
530 DEFine PROCedure long_multiply (i,j)
540 carry%=0
550 FOR units = 0 TO 15
560   result% = j * sevens%(i,units) + carry%
570   sevens%(i,units) = result% MOD 1000
580   carry% = result% DIV 1000
590 END FOR units
600 END DEFine long_multiply
610 :
620 DEFine PROCedure long_print (i)
630 PRINT count,
640 FOR units = 15 TO 0 STEP -1
650   d$ = "00" & sevens%(i,units)
660   PRINT d$((LEN(d$)-2) TO LEN(d$));
670 END FOR units
680 PRINT
690 END DEFine long_print
```

Figure Two.

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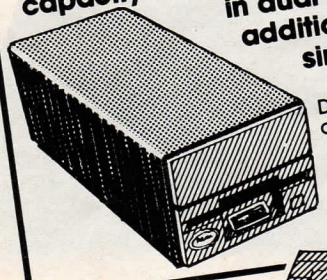

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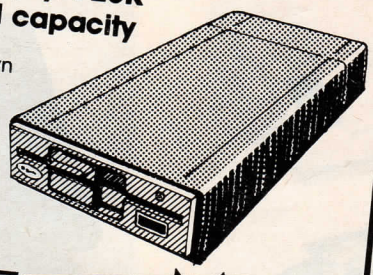

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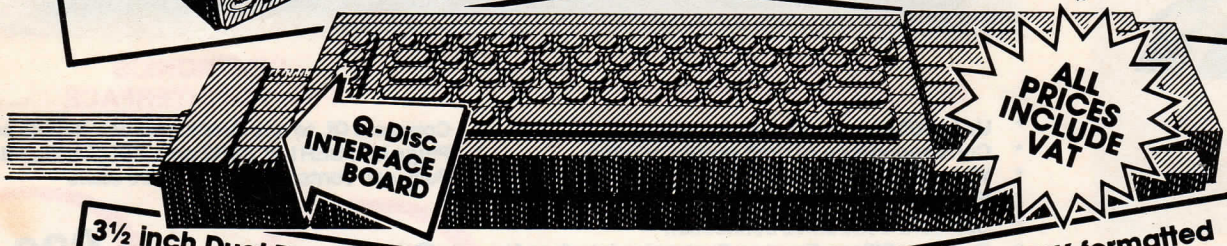

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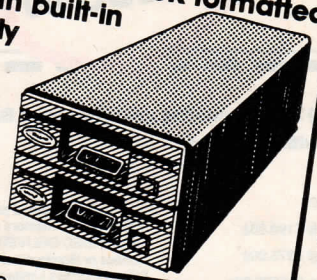

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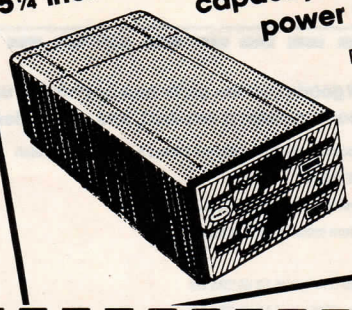

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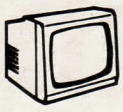

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THE UNPREDICTABLE MICRO

Our guide to QL astrology continues with this program to calculate planetary positions.

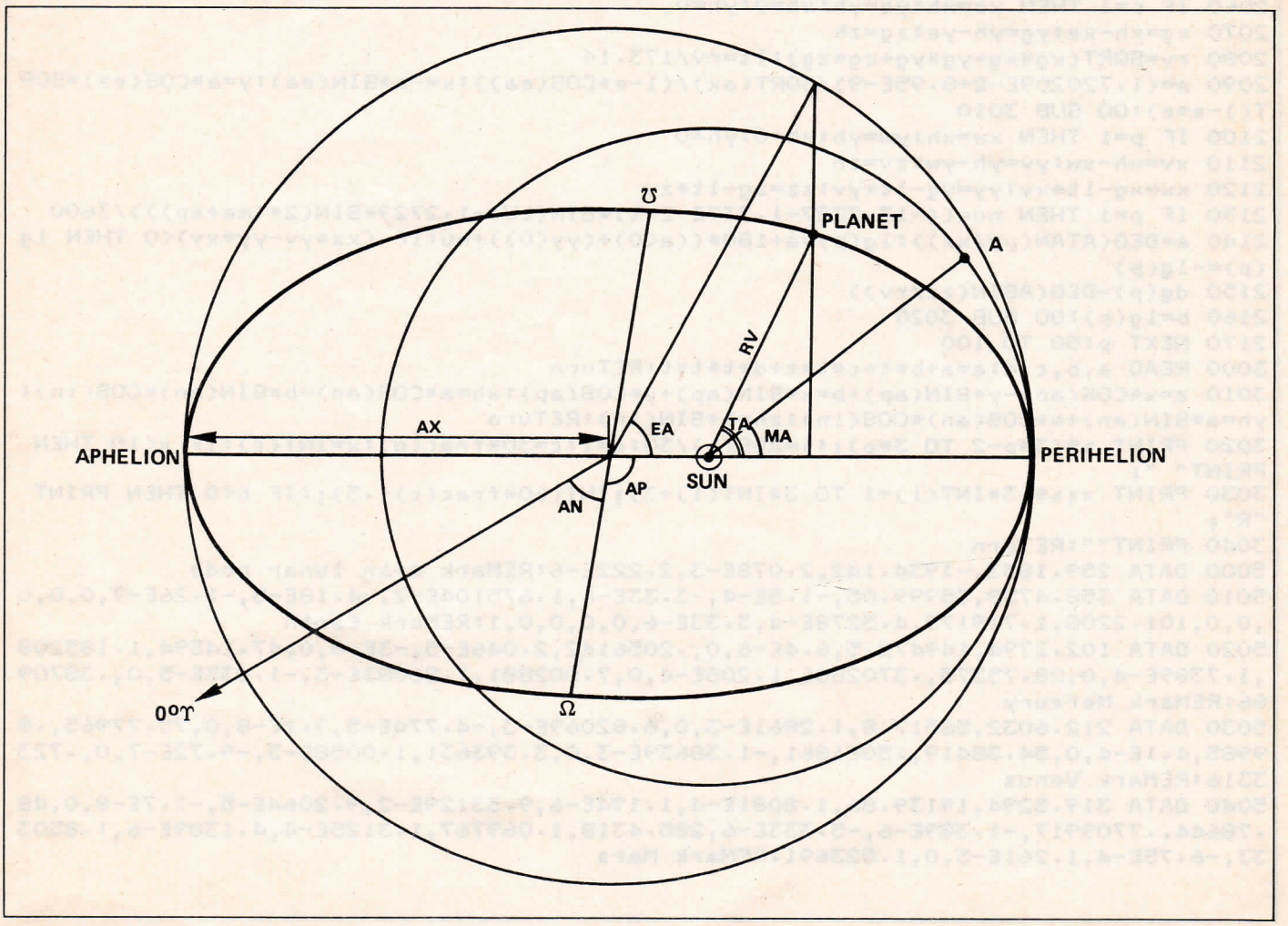
By John Dice.

TO CALCULATE the position of a planet to the kind of accuracy most astrologers need — let us say one minute of arc at the most — you have to use different styles of mathematics depending on the planet with which you are dealing. Fundamental to the calculations of all of them except the Moon is the solution for elliptical motion.

Our Solar System is held together by the gravitational pull exerted by the Sun on each of the planets. The factors which affect the orbits of the planets are to the masses of the Sun and planets and the distances between them; twice the distance results in a quarter of the attractive force. That dictates the elliptical shape of each of the planetary orbits. An ellipse looks like a squashed circle and has two foci. The Sun occupies one of the foci, as you can see in the diagram.

The mathematical properties of ellipses are well-known, so we may calculate a planet's position with relative ease. For our minute of arc accuracy that is all we have to do — with two minor corrections — for Mercury, Venus, Earth (Sun + 180°) and Mars.

Planets further from the Sun than Mars need closer attention. There the gravitational control from the Sun is much weaker and the planets are more easily 'perturbed' from their mean positions by the gravity of neighbouring planets. Those perturbations can account for up to one degree difference in logitude for Pluto, the most distant planet — we think. The problem is that nobody has yet produced a direct mathematical solution of this complex effect. People who tackle the perturbation problem seriously, like the U.S. Naval Observatory which publishes high-accuracy planetary ephemerides, tend to use a process



PLANETARY POSITIONS

```
100 s$="AriTauGemCanLeoVirLibScoSagCapAquPis"
110 p$="SunMooMerVenMarJupSatChiUraNepPluNod"
120 DEFine FuNction u(x)
130  x=x-360*INT(x/360)
140 RETurn x
150 END DEFine
160 DEFine FuNction frac(x)
170 x=x-INT(x)
180 RETurn x
190 END DEFine
200 DIM lg(12):DIM dg(12)
1000 INPUT "Name";n$
1010 INPUT "Day";d
1020 INPUT "Month";m
1030 INPUT "Year";y
1040 INPUT "Hour";h
1050 INPUT "Min";mi
1060 INPUT "Time Zone (E-W+)";tz
1070 INPUT "Delta T";dt
1080 PRINT:PRINT
1090 gmt=tz+h+mi/60+dt/3600
1100 i=12*(y+4800)+m-3:j=(2*(i-INT(i/12)*12)+7+365*i)/12
1110 j=INT(j)+d+INT(i/48)-32083:IF j<=2.299171E6 THEN GO TO 1130
1120 j=j+INT(i/4800)-INT(i/1200)+38
1130 t=(j-2.41502E6-.5+gmt/24)/36525
2000 RESTORE
2010 GO SUB 3000:LU=RAD(u(a))
2020 FOR p=1 TO 5
2030 GO SUB 3000:ma=RAD(u(a)):ea=ma:GO SUB 3000:e=a:GO SUB 3000:an=RAD(a):GO SUB
 3000:ap=RAD(a):GO SUB 3000:in=RAD(a):READ ax:IF p=2 THEN p=3
2040 a=ea-ma-e*SIN(ea):IF ABS(a)>1E-8 THEN ea=ea-a/(1-e*COS(ea)):GO TO 2040
2050 x=ax*(COS(ea)-e):y=ax*SIN(ea)*SQRT(1-e*e):GO SUB 3010
2060 IF p=1 THEN xe=xh:ye=yh:xh=0:yh=0
2070 xg=xh-xe:yg=yh-ye:zg=zh
2080 rv=SQRT(xg*xg+yg*yg+zg*zg):lt=rv/173.14
2090 a=(1.720209E-2+8.95E-9)/SQRT(ax)/(1-e*COS(ea)):x=-a*SIN(ea):y=a*COS(ea)*SQR
T(1-e*e):GO SUB 3010
2100 IF p=1 THEN xw=xh:yw=yh:xh=0:yh=0
2110 xv=xh-xw:yv=yh-yw:zv=zh
2120 xx=xg-lt*xv:yy=yg-lt*yv:zz=zg-lt*zv
2130 IF p=1 THEN nu=((-17.2327-1.737E-2*t)*SIN(LU)-1.2729*SIN(2*(ma+ap)))/3600
2140 a=DEG(ATAN(yy/xx)):lg(p)=a+180*((a<0)+(yy<0))+nu:IF (xx*yv-yy*xv)<0 THEN lg
(p)=-lg(p)
2150 dg(p)=DEG(ASIN(zz/rv))
2160 b=lg(p):GO SUB 3020
2170 NEXT p:GO TO 100
3000 READ a,b,c,d:a=a+b*t+c*t*t+d*t*t*t:RETurn
3010 a=x*COS(ap)-y*SIN(ap):b=x*SIN(ap)+y*COS(ap):xh=a*COS(an)-b*SIN(an)*COS(in):
yh=a*SIN(an)+b*COS(an)*COS(in):zh=b*SIN(in):RETurn
3020 PRINT p$(3*p-2 TO 3*p);:i=ABS(b)/30:q=i:c=30*frac(q):x=INT(c):IF x<10 THEN
PRINT" ";
3030 PRINT x;s$(3*INT(i)+1 TO 3*INT(i)+3);INT(60*frac(c)+.5);:IF b<0 THEN PRINT
"R";
3040 PRINT"":RETurn
5000 DATA 259.1833,-1934.142,2.078E-3,2.222E-6:REMark mean lunar node
5010 DATA 358.4758,35999.05,-1.5E-4,-3.33E-6,1.675104E-2,-4.18E-5,-1.26E-7,0,0,0
,0,0,101.2208,1.719175,4.5278E-4,3.33E-6,0,0,0,0,1:REMark Earth
5020 DATA 102.2794,149472.5,6.4E-6,0,.2056142,2.046E-5,-3E-8,0,47.14594,1.185208
,1.7389E-4,0,28.75375,.3702806,1.208E-4,0,7.002881,1.86083E-3,-1.833E-5,0,.38709
86:REMark Mercury
5030 DATA 212.6032,58517.8,1.2861E-3,0,6.82069E-3,-4.774E-5,9.1E-8,0,75.77965,.8
9985,4.1E-4,0,54.38419,.5081861,-1.38639E-3,0,3.393631,1.0058E-3,-9.72E-7,0,.723
3316:REMark Venus
5040 DATA 319.5294,19139.86,1.8081E-4,1.194E-6,9.33129E-2,9.2064E-5,-7.7E-8,0,48
.78644,.7709917,-1.389E-6,-5.333E-6,285.4318,1.069767,1.3125E-4,4.1389E-6,1.8503
33,-6.75E-4,1.261E-5,0,1.523691:REMark Mars
```

called Numerical Integration on a big mainframe computer. Because of cumulative errors, very high accuracy is demanded and it takes a considerable time — not really viable on a QL, especially if you want your answers in seconds of computing time rather than tens of minutes.

The most common expedient for a home computer is to generate the required perturbation functions by adding many sine waves of different frequencies and phases to synthesise or 'curve-fit' the errors. You then add those to the mean position represented by the elliptical model. It is the method used in Michael Erlewine's book, *A Manual of Computer Programming for Astrologers*, published by The American Federation of Astrologers, Inc. The Moon's motions are perhaps the most complex of all and the sine-wave method is used extensively.

I describe the solution for elliptical motion, giving better than one minute of arc accuracy for Sun to Mars. The input and output routines are not very elaborate — you may wish to add colours or specialised glyphs yourself.

The first section of the program, to line 200, sets up strings and functions for later use. Then the time is INPUT as a series of integers to enable a Julian Day number to be calculated. Day 0 in this system is Jan 1, 4713 B.C., but the program uses a Modified Julian Date counted from midday on 0 Jan 1900 — 31.12.1899. From that the Greenwich Mean Time is calculated the Century Increment T having a value between 0 and 1 this century. ΔT is an irregular time correction allowing for variations in the Earth's speed of rotation, hence the length of the Solar day. It is at present about 54 seconds, and the accuracy freaks will look it up in the American Ephemeris or the Astronomical Almanac. Otherwise enter "0" and you will not be far wrong.

Section 2000 is the meat of the program. The first thing calculated is the Mean Lunar Node — used later. That, like the other elements used in this program, is in the form $A+B*T+C*T^2+D*T^3$. All angular measures are converted to radians. A planet-counting loop is established, then the six Orbital Elements which define the orbit of a planet are evaluated. They are, in order of appearance:

1. Mean Anomaly (MA). a fictitious mean position for the planet, shown at "A" in the diagram, measured from its perihelion (Greek: peri, near; helios, Sun — meaning that part of an orbit which is closest to the Sun). A circular orbit is assumed in which the hypothetical planet moves at a constant velocity.

2. Eccentricity (E). A measure of how "squashed" the ellipse is. A circle is a special case of an ellipse with E=0, and where the two foci coincide at the centre.

3. Ascending Node (AN). The angle measured from 0 degrees of Aries to the point where the orbit goes north of the ecliptic – the reference plane formed by the orbit of the Earth.

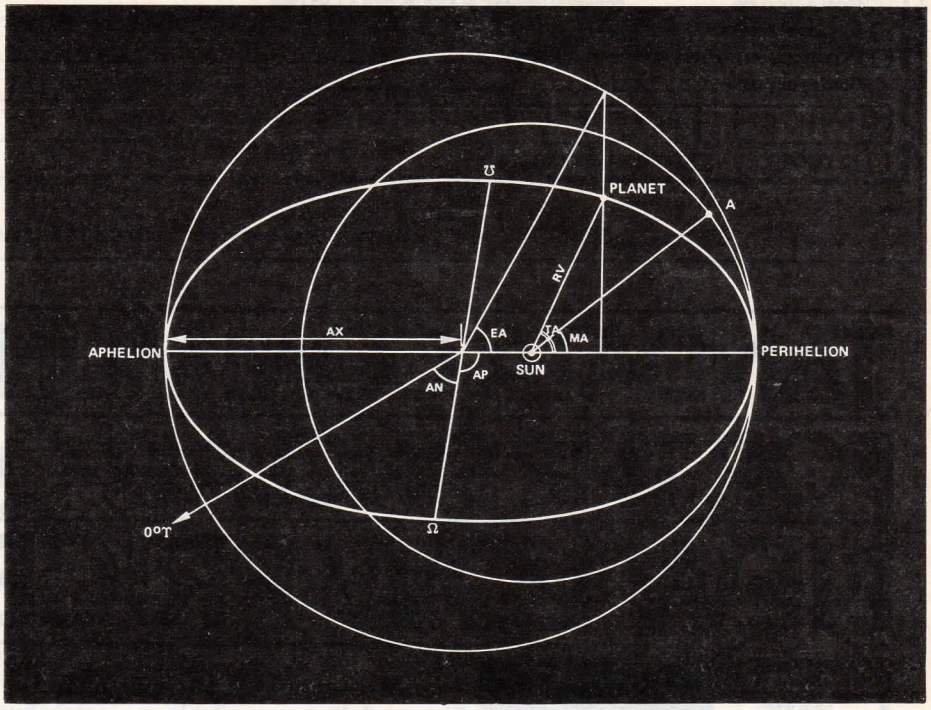
4. Argument of the Perihelion (AP). The angle from AN to the planet's perihelion, measured along the orbit rather than along the ecliptic.

5. Inclination (IN). The angle at which the whole orbital plane is tilted relative to the ecliptic.

6. Semi-Major Axis (AX). The size of the orbit in Astronomical Units. 1 A.U. is the semi-major axis of the Earth's orbit — about 150,000,000 km.

Line 2040 solves Keplar's equation for Eccentric Anomaly. Johannes Kepler (1571-1630) was the first to describe the elliptical orbits of the planets and established the laws governing their motion. His celebrated equation, EA=MA+E*SIN(EA) (all angles in radians) cannot be solved directly, hence the iterative loop in this program. It converges to an accuracy better than required in three or fewer iterations. EA looks like, and is, a fairly abstract quantity but has many computational uses, as you will see.

Line 2050 gives the X and Y co-ordinates of the planet's true position in its orbit. This co-ordinate system places the Sun at its centre (0,0) with the positive X axis passing through the perihelion. The ROTATE subroutine (3010) rotates the whole ellipse in space and tilts it into the position it occupies in reality. The result is the rectangular heliocentric co-ordinates of the planet's true position. In this co-ordinate system, the X and Y axes are directed along the celestial equator, and they are positive towards 0 degrees of Aries and Cancer, respectively — for the mean equinox and ecliptic of date. The 2 axis is positive towards the north celestial pole.



Line 2060 stores the Earth's co-ordinates and 2070 subtracts them from the heliocentric co-ordinates of a planet to give geocentric positions. The Sun's co-ordinates (0,0) are entered in 2060, so as to find its geocentric position. The Z co-ordinates are ignored in this practice, because the Earth orbits in the plane of reference and always has Z=0.

We are getting close. The accuracy at this point is probably a usable two minutes of arc incorrect at most for the Sun out to Mars for any date this century. We need to know the retrograde status of the planet and one of the two most worthwhile corrections, aberation, uses much of the calculation used for retrogrades. Aberation really means correction for light-time.

We deal with such vast distances in this Solar System that by the time the light from some distant planet has reached us on Earth, the planet and the Earth have moved somewhere else. What we want to determine is where the planet appeared to be at a particular time, rather than its true position. That may sound odd and some astrologers are doubtful as to the validity of such a concept for their work but most have not heard about aberation or thought about it, so the mainstream opinion is to go along with the astronomers on this one and correct for light-time.

So line 2080 finds the Radius Vector, the distance from Earth to planet, and uses it to find the light-time in days. Line 2090 finds the elliptical Velocity vectors (in A.V. per day), then uses the ROTATE subroutine again to place those vectors in their positions. Lines 2100-2110 convert the heliocentric velocities to geocentric and line 2120 multiplies light-time and velocity to get distance travelled in the light-time. That is the aberation which is subtracted from the geocentric position in line 2120.

The second correction is notation, the irregular wobbling of the Earth's axis due to the gravitational action of the Sun and Moon on the equatorial bulge of the Earth. Nutation is a short-term component of a much bigger and slower wobble called precession of the equinoxes which causes the point 0 degrees of Aries to move backwards through the entire Zodiac in 26,000 years. Precession has been included in the values of the orbital elements given in the DATA statements but nutation must be dealt with separately.

So in line 2130, when the Sun's orbital elements are easily available, we calculate nutation from the Sun's mean longitude and the lunar node. That is added to the longitude derived in line 2140, which also negates the answer if a retrograde is detected. Declinations are computed in line 2150 for those keen on declinations. Then the PRINT subroutine is called to print the position in degree and minute notation — then on to the next planet.

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BOOKMARKS

This month a roundup of the best QL titles to have appeared in the last six months.

To start, some of the volumes designed to increase your programming prowess. Among the 10 books Hutchinson publishes for the QL, no fewer than three cover SuperBasic programming. The lastest, *Making The Most of The QL* by Dick Meadows, aims to be a practical guide to using the QL both for beginners and more experienced users. It gives an overview of the SuperBasic language and includes chapters on peripherals, applications programming, and graphics. at £7.95, it is an ideal book for those who want to brush up their programming technique.

SuperBasic on the Sinclair QL, by Donald Alcock, looks lightly at programming, and graphics. At £7.95, it is unusual style — handwritten text with plenty of diagrams and listings — should prove informative for those who want to expand a limited knowledge of the subject. Published by Cambridge University Press, it costs £5.95.

Helping you release the full potential of the QL, is the claim made by *Maximise your QL* by Susan Curran and Ray Curnow. Published by Papermac at £8.95, it reckons to pick up where the user guide ceases. Topics covered include printers, the Psion packages, files and Microdrives, and graphics. It concludes with a look at the internal workings of the machine — memory management, Qdos, and the Qlan local area network. Intended for those inexperienced, or perhaps just confused users, who have exhausted the User Guide, it also includes some suggestions for applications.

Adam Denning's *Advanced QL Machine Code* makes light reading of a potentially heavyweight subject. Although not intended for the complete novice, it takes the time to give a general introduction to the QL and the 68008 MPU. Subsequent chapters deal with Qdos, incorporating machine code utilities into SuperBasic, file handling, multi-tasking, job control, and screen handling. The extensive appendices include games and utilities listings, as well as the Qdos systems variables. In all, it is a comprehensive guide for the machine code programmer. Published by Duckworth at £8.95.

At the same price, from Sigma Press, is *The 68000 User Guide* by Lionel Fleetwood. It is the kind of book the novice would do well to read before tackling Denning's book. In common with most texts on microprocessors, it begins with an introduction to 68000 architecture — the physical structure of the chip. There follows a section on assembler which deals with the instruction set and addressing modes.

There are also chapters on using stacks and registers, moving data, writing subroutines, and bit-level operators. It is rounded-off with two chapters on how to improve your programming style.

Two books on the same subject but with a very different approach are *The Sinclair QDOS Companion,* by Andrew Pennell, and Adrian Dickens' *QL Advanced User Guide.* The Qdos Companion begins with a history of Qdos and then describes memory organisation with the aid of memory map diagrams. It proceeds with a detailed examination of multi-tasking, input/output, device drivers, interrupts, and external ROMs. Two more chapters look at the 8049 second processor and Qdos utilities. The style is informal and probably more suited to those who require an introduction to the subject rather than a reference manual.

If it is a reference manual you seek, then look no further than the *QL Advanced User Guide.* Starting with an introduction to the 68008, the book presents an overview of Qdos and a program which enables you to access Qdos from SuperBasic. A full listing is given, together with some example programs in assembler. The remainder of the book covers all aspects of Qdos in a reference format.

The Sinclair QDOS Companion is published by Sunshine and costs £6.95. *The QL Advanced User Guide,* published by Adder, is £12.95.

One of the many books on using the Psion packages, but one of the few to include them all, *Sinclair QL in Business,* by Arnold Handley, has a light, refreshing approach to putting the applications to work. Chapter headings include Quill, the unofficial ways — tricks not in the manual; Abacus as a word processor?; Writing a report to the boss; and Abacus with no numbers at all — the fastest duty list. Despite the humourous approach, the book contains much useful information and good advice, although it obviously does not go into the same depth as similar publications which cover only one program. It costs £9.95 and is published by Newnes Microcomputer Books.

QL Archive is dealt with in a much more detailed fashion in the Century *QL Archive* by Ian Murray, costing £14.95. It may sound expensive but for your money there are 350 pages of information and advice. The book is suitable for beginners and the more experienced who want to use it as a reference guide.

The step-by-step approach takes the reader through each stage with plenty of practical examples and some business applications. Among other things, subjects covered include information storage and retrieval, multiple files, finding and sorting records, designing screens, and linking files to be used in more than one application. Three other books in the series deal in a similar manner with Quill, Easel and Abacus.

Still on the subject of Psion software, *Word Processing With QL Quill,* by David Dempster, attempts to suit everybody from the novice to experienced word processor operators. While that approach is not an unqualified success, the book is sufficiently well-organised enough to include something of value to most Quill users. The appendix contains a reference section which gives a brief description and cross-reference to additional information in the text. The book is one of the Longman series *Working With The Sinclair QL,* which also includes two books on Abacus and another on Archive.

Diary of a QL User

PART TWO

The third and concluding (definitely) part of our dipsomaniac's diary — Samantha Mead.

9.30 a.m. There is clearly one golden rule to be followed when learning your way round the QL — never allow too much time to elapse between sessions. If nothing else, all this hi-tech is infinitely forgettable from one month to the next. Settle to final session with QL, only to discover that expert has unearthed a quirk he finds so fascinating that I am not allowed near the micro. Further, when he discovers the solution, he is so pleased about it he will tell me only that "It's buried deep in the manual" and assumes I will not be able to work it out.

I have to say that there are disadvantages to having one of these otherwise useful beasts in the house. The trouble with experts and QLs is they suit each other admirably and can combine to give beginners inferiority complexes as well as hangovers. Treat mixture with extreme caution.

As for the quirk, it is just a small matter of getting the QL to talk to a printer. It appears that just because you have managed finally to acquire a printer lead, you should not assume automatically that you will be able to use a printer. Even deciding into which socket to plug the allegedly standard British Telecom jack is not straightforward and is not helped by the fact that it does not appear to be a standard British Telecom jack, but that's another story. Suffice it to say you are better off with the official Sinclair printer lead than making one yourself, assuming you thought of being so clever anyway, which you might do since you get more help from the manual on that than on merely printing-out your listings. Odd people, these manual writers. Since I hope to be using a serial printer, I have plugged into the SER1 socket and all I have to do is to tell the printer to print.

Excuse me for the next few hours.

10.45 a.m. I have worked my way through Beginners' Guide and have experienced certain frissons of excitement when discovering in Chapter 12 the sub-heading Simple Printing. Expert points out smugly, however, the main chapter heading is Screen Output and a printer is not involved. On to Chapter 13, which although it says it is about Arrays, clearly does not want to help me array anything on paper. End of Beginners' Guide leaves me as ignorant of printer/micro relationships as I was initially. So although I can get together simple listings, I can't print them.

Since Editor wants copy this week, not next year, I grit teeth so as not to sink them into expert and ask politely for help. Smiling sweetly, expert refuses to tell me how to print from Basic and suggests I try printing a Quill document instead, which might at least make the printer work.

Try not to sound too insincere as I thank him for pointing out the obvious and turn to Quill section, page 19, which tells me that if I haven't hooked-up the printer correctly nothing much will happen. Oh, they're all coming out with the helpful advice this morning. When I have followed all the other dynamic instructions given on page 19, the Microdrives whirr, click and stop, the printer hiccups, emits two random characters which bear no relation to anything, and stops. Expert nods wisely and says he knew it would do that and would I like him to try to find a solution?

Leave him in possession of QL and go to look for offensive weapon. Return to find printer has printed what appears to be three letters of the Greek alphabet and expert is, bafflingly, looking even more smug. It appears that although I am attempting to use an RS232 printer, almost any of which, according to the manual, is satisfactory for the Psion packages, I have not yet attached the correct printer program to Quill, which is something I am told to do only in the Information section to be found at the back of my manual. Full (?) instructions given here and it must all be done before you load Quill. Push expert off chair to relieve feelings.

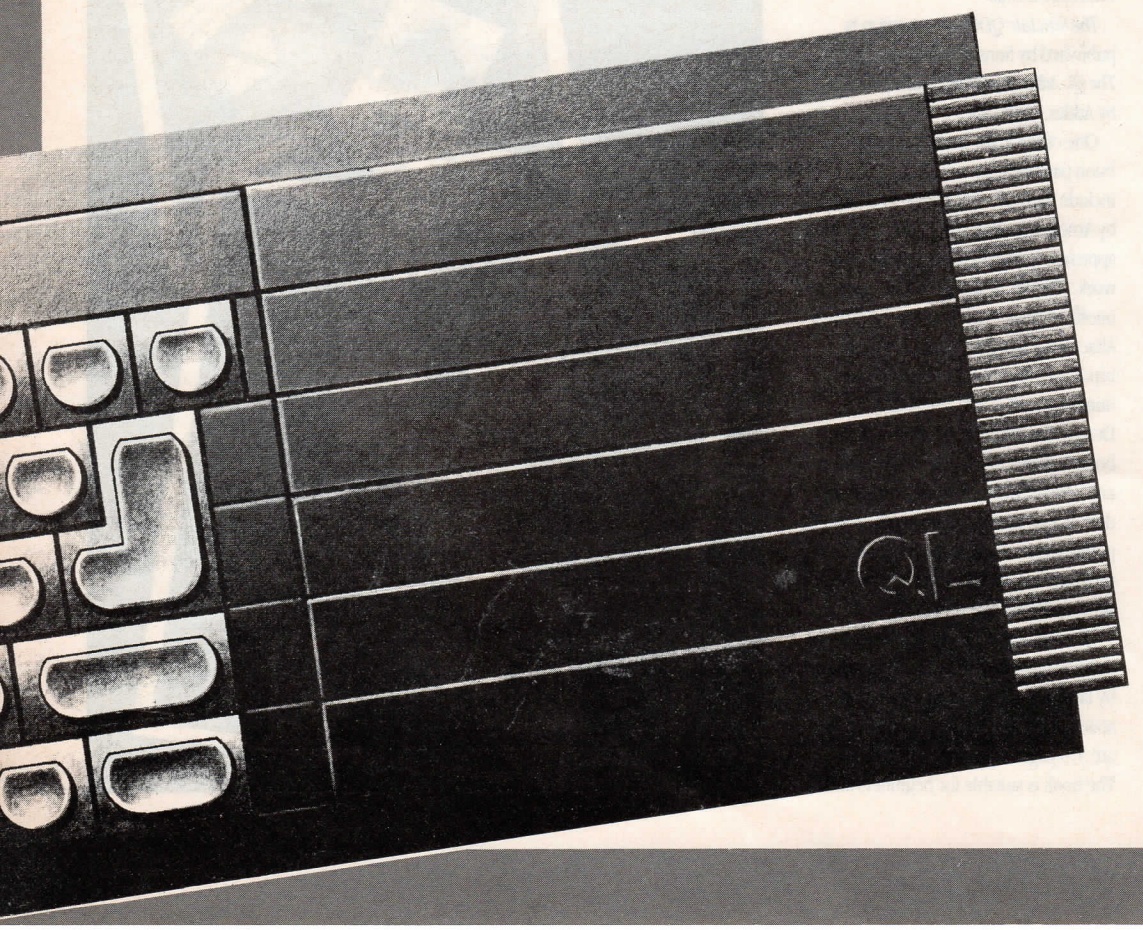

Illustration by Steve Dew

Screen information tells me that if I had an Epson FX80, Quill would probably have printed-out first time. Far be it from a mere beginner to suggest that a manual designed to help me might have mentioned that in Chapter 1, page 1, of the Introduction. Anyway, I have a Brother EP44, a printer which is not one of the eight mentioned in the print-driver software which needs to be patched into Quill. So I still have a problem. Take break for coffee and tranquillisers.

12.30 p.m. The information section tells me if my printer is not included in the list of eight, I have two options. Do nothing, in the hope that the routine given will please my printer anyway, because "almost any printer" should cope. Of course, mine is one of the allegedly rare models which does not, so I try option two and install a driving program which is compatible with the specification of my printer. If you have mislaid the handbook for your non-QL-approved printer, you might be in big trouble here. If you can determine your printer's baud rate and general operating parameters, the QL manual will do the rest – finally.

Anyway, with a good deal of help from a now unbearably self-satisfied expert, I finally achieve a printout on a real sheet of paper, probably the hardest piece of copy ever. It is a shame it does not say anything more earth-shaking than "Hello World."

It has to be said, though, that I am way out of my depth on this printer lark and I really can't find anything on the subject in the manual which could be interpreted easily by a novice. Left to my own devices, I would still be sitting up all night with a mutinous printer hiccuping nonsense at me and I have just realised that I still cannot print from Basic.

3.00 p.m. Go on treasure hunt through manual to solve mystery of printing from Basic, collecting nuggest from Beginners' Guide (p67), Concepts (p13, p16, p17) and Keywords (p4, p8 and p40), not necessarily in that order. As with all good games, clues are heavily disguised and I am not so thrilled with the prize. Never mind, at least I get paid. Where you find consolation, gentle reader, is your problem.

Expert is beside himself with glee about the solution, which I give you without the slightest pretence of understanding it. Those sufficiently masochistic to wish to learn for themselves, close your eyes now; the rest, read on.

To print from Basic, simply – hollow laughter – attach a DEVICE to a CHANNEL. SER1, which is the socket masquerading as BT compatible, is, it appears, a DEVICE. A CHANNEL, which is a line of communication between the micro and the printer, is opened by the command OPEN #3, SER1.

My printer, the Brother EP44, needed the command BAUD 1200 as well and a C tacked on the end of SER1. The command PRINT is followed by #3 each time it is used, assuming that hard copy is required, and it had better be after all I have been through! LIST #3 sends a listing to the printer and money sends expert to the off-licence, which serves not only to top up my alcohol level but also to get him out of the way while I recover my temper.

4.30 p.m. Decide to sample a little sophistication to smoothe my nerves, in the form of SuperBasic, moving as I do so, the manual tells me, into a remarkably advanced computing environment. How I can cope with that when I could not even crack the printer fiasco remains to be seen. There is no dobut this manual has a trick of making the would-be user feel significant. The manual and I proceed to discuss the main features of SuperBasic.

The first example of this remarkably-advanced computing environment which we discuss is:

LET pet1$ = "CAT"
LET pet2$ = "DOG"
IF pet1$<pet2$ THEN PRINT "Meow"

Decide to take a break before all this sophistication overwhelms me.

6.00 p.m. Back at the keyboard for the night shift, I am enthralled by the simplicity of it all. Assured by the manual that SuperBasic always tries to be "intelligently helpful" and will not reject my efforts out-of-hand unless they are completely hopeless, I type-in an attractive program all about flying kites and clearing garden sheds. I check it very carefully and even remember a few things I learned last month; then I sit back and wait for something to happen. It does. Helpful, intelligent SuperBasic reports At line 100 ERROR IN EXPRESSION. I check again. I am hurt. I have copied it exactly as printed. I look up the message in the Concepts section, to be told that "an error was detected while evaluating an expression." Not so. An error was detected while following the manual — by me. Scream for expert, who corrects manual with red pen. I insert semi-colon after the INPUT statement in line 100 and the program runs. Super, if a little basic.

Intrigued by my brief encounter with the Concepts section, I browse a little further. I discover that not only are the names of all the socket pins merely concepts, so, too, are the Microdrives.

Could this open a whole new controversy on the subject? Delighted by those revelations, I research further to find that instructions on starting-up the computer are to be found here, as are details on almost everything else the manual hitherto has ignored. Perhaps that is why the instructions on putting together the manual recommends Concept section for a middle slot.

Clearly, innovation applies to the English language as well as the firmware of the QL — another first for Sinclair Research.

Also included in the section is the concept — yes, really — of SOUND. Now this I have to try. On a first reading of the relevant sections of the manual I suspect that it si more a case of making it sound good than it really sounding good, and guess what? I am correct. Much waffle about fuzziness — deliberate — and randomness — intentional — and not too much about how to achieve a recognisably musical note — missing altogether. Two options here. Either you do it the difficult way, by trial and error, or you do as I did and consult back issues of *QL User* to find which of the numbers from 1 to 255 correlate with which notes on a musical scale. All in all, SOUND can be said to have gone with a whimper rather than a bang but the QL never pretended to be a music centre.

11.20 p.m. Decide to give Archive, Abacus and Easel a miss, on the grounds that the first two are not suitable for novices and the graphics package is fully interactive, according to the manual, and sounds far too strenuous for this time of night. This decision helps me to realise that I may well be nurturing the first symptoms of keyboard junkism, and make second stand of the day, but turning off QL. I feel that further excursions should be undertaken away from public gaze; this exercise shows every sign of becoming a long-term obsession.

Despite the disasters and frustrations, I am reasonably confident that I now have a rudimentary knowledge of the workings of the QL. The only trouble is that I also now have a drink problem and am suffering a crisis in my relationship with expert — but everything worth knowing has its price, they say.

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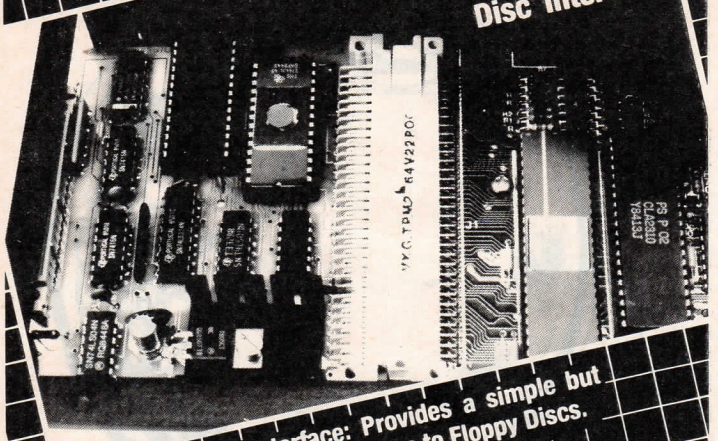

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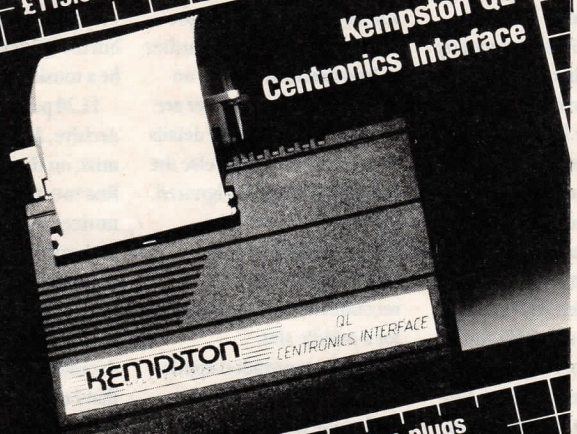

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SOFTWARE APPLICATIONS

A brief resumé of some of the business packages available for the QL, plus some readers' suggested applications.

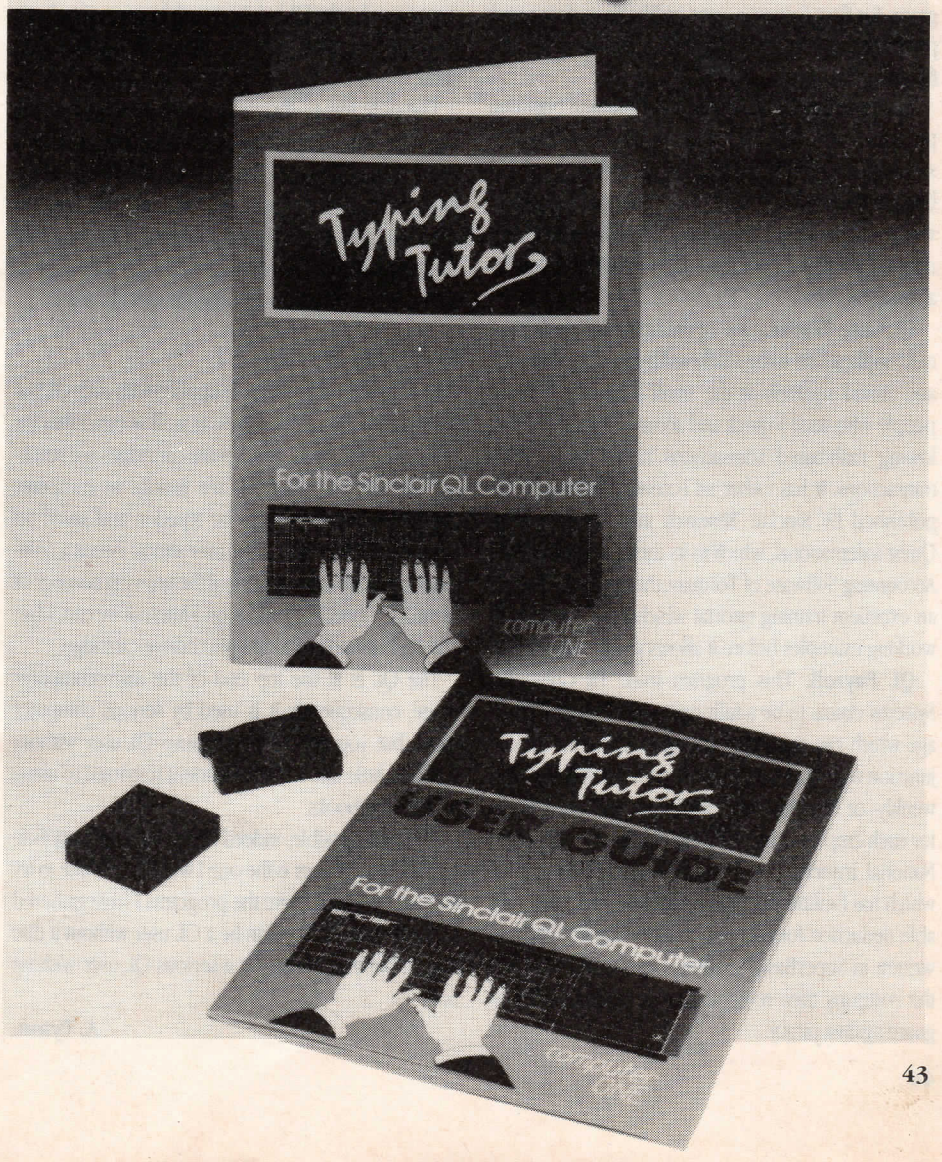
When the QL was launched, there were many who hoped it would become the affordable computer for small business. Business software accordingly was developed to handle everything from payroll to management, accounting to project planning. . .

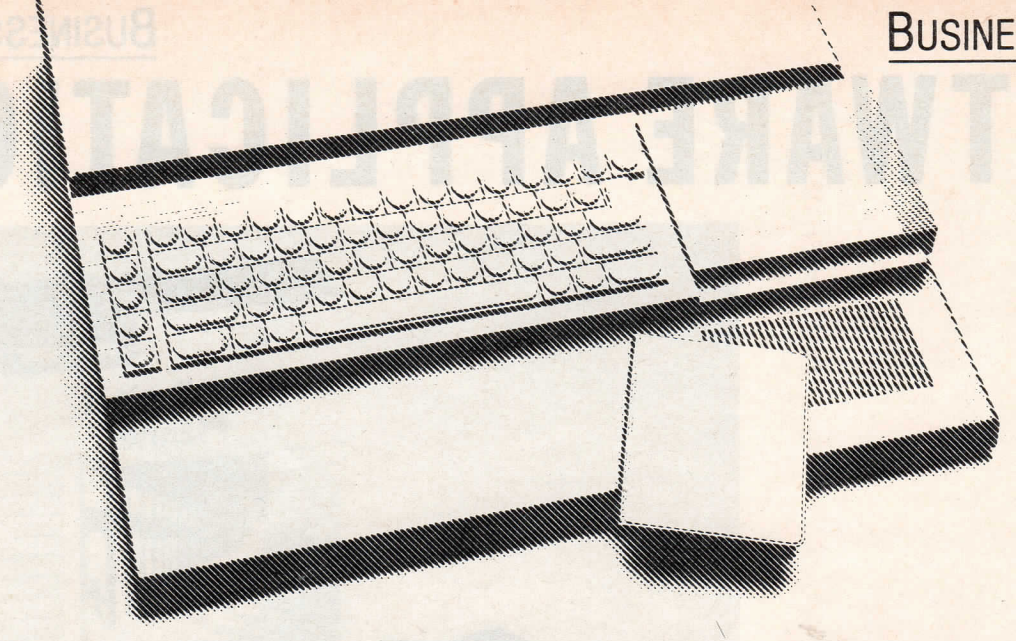
QL Quill. It is a testament to its power and popularity that no other word processor has been marketed successfully and sold in large numbers for the QL. It is an excellent word processor, from the WYSIWYG — What You See Is What You Get — screen layout, to the word-count and export facilities. Early versions of the program were frustratingly slow and we would definitely recommend an upgrade to anyone still using them; the speed increases are fantastic and it is a relief to see many of the bugs eradicated. Despite the fact that there is no better word processor for the QL, it is a pity that Psion could never release a spelling checker — although one is sold independently by Eidersoft — or a reasonable Mail-merge facility for it.

QL Abacus. Again there have been no other spreadsheets to equal the Psion original for the QL. It has been upgraded considerably since the original release, although speed was never one of the problems with Abacus. The other major headache — hooking-up printers — has also been solved with the new releases.

QL Archive. As the QL has attracted a variety of software developers, so Archive, the definitive Psion Database for the QL, has proved its position with a selection of enhancements developed specifically for it. Simplicity was never a strong point with Archive but that was sacrificed for the versatility which has proved so essential.

QL Integrated Accounts. The Sagesoft Sinclair-sponsored accounts package is probably the most powerful package in relation to the versatile features it offers. While providing all the facilities of the IBM and





Apricot versions, the multi-tasking and window facilities of the QL are used to enhance the package. The problems of complex manuals for the system have been alleviated by providing a tutorial program which takes you through the relevant accountancy disciplines.

QL Entrepreneur. Another Sinclair-sponsored package, from Triptych Publishing, designed to build the basic skills necessary to start your own business. Having gone straight from business school, the members of Triptych are well-suited to develop your knowledge, using comprehensive manuals and special tutorial programs. They are enhanced further by programs for flow forecasts, year-end balance sheets and profit/loss accounts — everything necessary for the first steps into business.

Entrepreneur is one of a series of business planning programs from Triptych, which also includes QL Decision Maker — which helps examine the risks, costs and benefits of a given business proposal in a diagramatic way — and QL Project Planner, a modern project planning system which helps estimate the time needed for a variety of jobs.

QL Cash Trader. One of the first third-party business applications to be marketed by Sinclair Research and aimed squarely at the small business. It is for people who want a quick and accurate method of following cash-based transactions rather than credit transactions. It has rather an eccentric history, being published by Sinclair Research and licensed from Quest International, which in its turn acquired it from Accounting Software of Torquay, the authors. There is an excellent training tutorial which runs through 14 working examples before it allows you to use it fully.

QL Payroll. This program from TR Computer Systems claims to be a fully-operational payroll package which can run either as a stand-alone or in conjunction with a tailored software package. It copes with weekly- or monthly-paid employees and can include for each employee six deductions over and above tax, National Insurance and pension deductions, one of which has facilities for loan repayment and one a variable deduction for each pay period. The original was written in SuperBasic to allow easy modification but the company then re-wrote the program in BCPL to guard against piracy.

Typing Tutor. No list of business software would be complete without mention of the ubiquitous Typing Tutor. There are several for the QL but one of the first was from Computer One, which is in a shrink-wrapped package with a 14-page manual. The manual is small, as the program provides most of the documentation internally. There are 11 typing lessons, each designed to provide greater facility with the keyboard. The only real problem with Typing Tutor is the QL keyboard, which does not necessarily lend itself to touch-typing as keys tend to auto-repeat far too frequently.

Figure one shows most of the major business software types for the QL but it is worth bearing a few basic principles in mind when shopping for each applications.

The only way to choose between similar-sounding packages is by having a very clear idea about what it is you want the QL to do. That method of software selection is known by jargon-lovers as the systems approach. All it means is that you build your computer hardware and software collection with the idea of developing a system to accomplish specific tasks.

Store And Retrieve

Four business programs are supplied with each QL but they need back-up cartridges, as well as cartridges for storing their data. More software cartridges are reaching the market and there are listings in computer magazines, all available to be typed-in and saved on Microdrive cartridges. A QL user almost needs a computer program to keep track of the growing number of cartridges, saved, or course, on a Microdrive cartridge, and backed-up on another Microdrive cartridge.

The QL is at the top end of the microcomputer range, consequently it is used by serious computer users, but you cannot be a serious QL user without feeling a little like a history student restricted to using A6 size notebooks.

The best possible, indeed the most urgent application for any QL user is the one I would most like to try — to store and retrieve the programs I have gathered on a disc system. You can be a QL user without a disc system but you cannot be a serious QL user without one.

A. Tyson.

Theatre Lights

For designing theatre lighting plans I am developing a program aimed at making it possible to obtain printouts of overall layouts rapidly and complete lists of levels for the individual cues.

Although most modern lighting boards have a form of in-built file storage, back-up requirements, frequent need for reference and the fact that very few boards have interfacing potential, necessitate making available frequently updated hard copies.

The inevitable experimentation in the early stages of design can easily involve many drastic changes, the effects of which frequently require alterations throughout subsequent cues, resulting in large amounts of time-consuming and tedious paperwork when using conventional methods.

The problem is particularly acute in the event of equipment breakdown which, while a relatively rare occurrence, can be catastrophic without means for recording an acceptable alternative as rapidly as possible, together with a list of changes throughout following levels to allow for reduced efficiency.

Mike Vaughan,
Copenhagen,
Denmark.

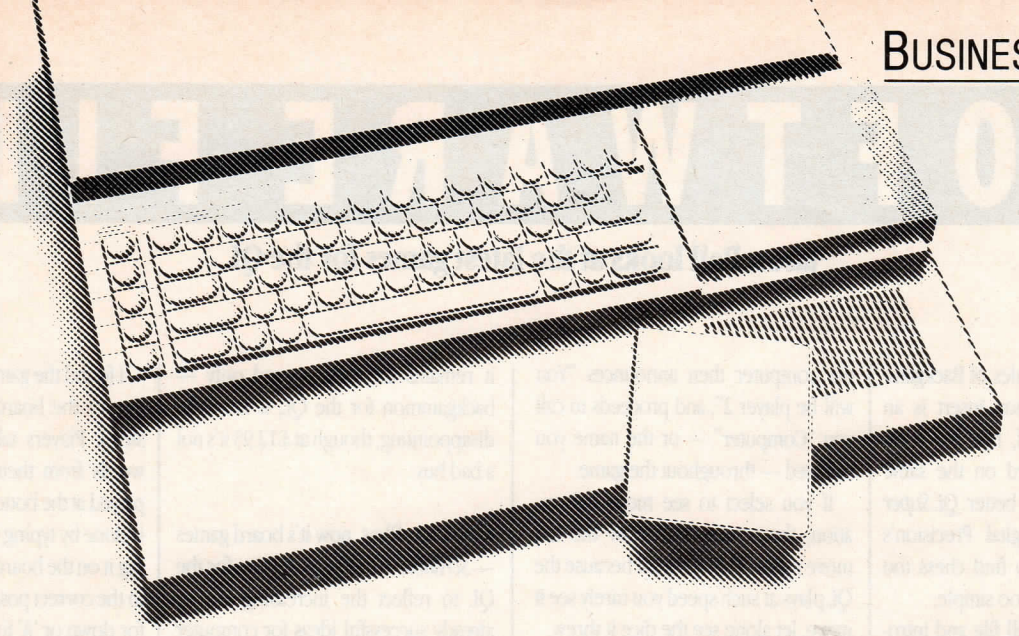
Analogue-to-Digital

In the department where I work, our secretary has an IBM word processor. She has tried my QL and she is very impressed. Everything her machine can perform the QL performs easier and faster. There is only in one respect the IBM is superior — it has discs. One is for loading the program and the other for storing documents.

I use my QL with a Brother EP 44 printer and a Finlux SM 9510 RGB monitor. The QL was delivered to me when I lived in Bath in June, 1984.

When available, I will buy an A/D converter to use the QL as a data collector to measure temperatures to optimise the heating system in our house. If the A/D converter is connected to the bus, I would like to make fast two channel measurements to calculate the cross spectrum used for noise intensity measurements.

Urban Anderson,
Johanneshov,
Sweden.



Name of Software	Supplier	Type	Price	Telephone
QL Bank Account	Cenprime Software	Accounting	£19.95	0203 686162
Typing Tutor	Computer One	Typing Tutor	£14.95	0223 862 616
Transact Book Keeping	Dialog Software	Accounting	£34.95	Epping 77871
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Tascopier QL	Tasman Software	Screen Dump	£12.90	0532 438301
Mailing List	Transform Ltd	Mailing List	£14.95	01-658 6350
Stock Control	Transform Ltd	Accounting	£14.95	01-658 6350
QL Appointment Diary	Transform Ltd		£24.95	01-658 6350
QSpell	Transform Ltd	Spelling Checker	£19.95	01-658 6350
Payroll	Transform Ltd	Accounting	£63.25	01-658 6350
Integrated Accounts	Transform Ltd	Accounting	£89.95	01-658 6350
Archive Adjustment	Transform Ltd			01-658 6350
QL Key Definer	Transform Ltd	Quill Utility	£9.95	01-658 6350
QL Calc	Transform Ltd	Calculator Utility	£9.95	01-658 6350
Multi Tasking	Transform Ltd	General Utility	£14.95	01-658 6350
QL Project Planner	Triptych Publishing	Decision Analysis	£39.95	
QL Integrated Accounts	Triptych Publishing	Accounting	£39.95	
QL Entrepreneur	Triptych Publishing	Decision Analysis	£39.95	
QL Decision Maker	Triptych Publishing	Decision Analysis	£39.95	
RefQL7	WD Software		£7	0534 81392

SOFTWARE FILE

Jason Ball looks at the latest games for the QL

To fit the complete rules of Backgammon on a cassette box insert is an achievement in itself, but the computer game described on the same insert should be even better. *QL Super Backgammon* is Digital Precision's answer to those who find chess too complex and reversi too simple.

Complete with Quill file and introductory instructions, the game is played by two opponents, be it the QL against itself, a player against the QL or two players against each other. To explain the rules would take too long, but for those of you unfamiliar with the game you must move your 15 counters around the board into your home section and remove them before your opponent does the same. In order to win you must block the opponents moves, take his counters and throw high scoring dice.

As is so often the case with computer generated board games, movement of pieces and the throwing of dice is limited to the keyboard, and with backgammon this is usually part of the fun (like the handling of cards in a game). But you are given the opportunity to have a game when you're alone with the QL.

As usual the two dice are thrown by the computer, but for those of you who want a false realism and know that a computer cannot generate truly random numbers, you can throw your own dice and input the values. This is especially useful if you want to beat the computer at the top level, but obviously relies on your morals.

Unfortunately, playing the game itself is complicated. The board is set up for you, but having chosen your opponent, his name, the doubling cube, play level, move information and whether you throw the dice, you could be well into a game on a real board.

To make matters more confusing, the instructions state: "If you play the computer, you will be player 2 — Green." Having chosen this option the computer asks for the "Name of player 1:". You might type in "Computer", or give the QL the name of a famous player — if you know one. However, the computer then announces "You will be player 2", and proceeds to call you "Computer" — or the name you selected — throughout the game.

If you select to see move information, the screen will show the last move made. This is useful because the QL plays at such speed you rarely see it move, let alone see the dice it threw.

When playing, the values of your dice are shown and you are asked from which position you will move your counter. Having entered the number corresponsing to the position, you must type in the destination of that piece. Moves must be taken individually. If you throw a 2 & 3, and wish to move a single counter 5 places, each move has to be separate, so play is rather slow.

If you imagine a chess board, the pieces at the bottom of the screen are usually yours, to put the board in perspective. Not so with Super Backgammon. Digital Precision had decided that you should play as though sitting on the far side of the board, which is most confusing, particularly for a player of the real thing. Also, if you make a wrong move, there is no opportunity to correct it.

There seems to be some discrepancy about gambling. When the message 'Double the stake?' comes up, you are never quite sure if the question is directed at you or asked on your behalf. If the latter is true, and you don't accept, the other player will not be asked if he wants to double. But if you were asked, and you don't accept, bang goes your game. The only really useful feature in the game is a help option for beginners, which will suggest the best moves to make.

In terms of programming achievement, QL Super Backgammon is brilliant, and the speed at which it performs confirms this. However, for the player the game is both unfriendly and confusing, and the increased speed that Digital Precision have strived to achieve tends to make the moves confusing. I really looked forward to playing the game when I saw its features and potential. In reality though, while it remains the best — and only — backgammon for the QL, it is a little disappointing, though at £12.95 it's not a bad buy.

First it was films, now it's board games — *Scrabble* is the latest release for the QL to reflect the increasing use of already successful ideas for computer games. These, the software manufacturers hope, will be as attractive on a monitor as they are on the big-screen or kitchen table.

One such company is Leisure Genius, a trade mark of Winchester Holdings Ltd. who has secured a deal with J. W. Spear & Sons PLC to reproduce their most famous board game — Scrabble.

Computer Scrabble for the QL is a beautifully presented package which is well thought out and consequently easy to use. For those of you unfamiliar with the game, each player must construct words from his rack of seven given letters, incorporating at least one letter already on the board. The word is placed horizontally or vertically on the board and scores points according to the value of letters used and the positions they cover. The program caters for up to four racks, each of which can be played by a person or the QL.

After a cute introductory picture showing a likely golfer next to an unlikely 19th hole, the Scrabble board is drawn and a series of questions must be answered before play begins. These cover resuming a saved game, playing against the clock, players names and skill levels. While the package states four skill levels for the QL, there are in fact eight. Alternatively, pressing Return instead of a number will select a human to play.

The final options allow you to view words tried by the QL when playing, to see the racks of all players, to turn off the sound and to select the time it takes for letters to be placed on the board. Simply pressing the Return key gives logical default values for all question, so you can quickly get on with the game.

I found the game surprisingly addictive — the board game sends me to sleep. Players take it turn to create words from their rack of letters displayed at the bottom of the screen. This is done by typing in the full word, placing it on the board with the cursor keys in the correct position and pressing 'D' for down or 'A' for across. The QL will calculate and display the value of the move which you can then accept or reject.

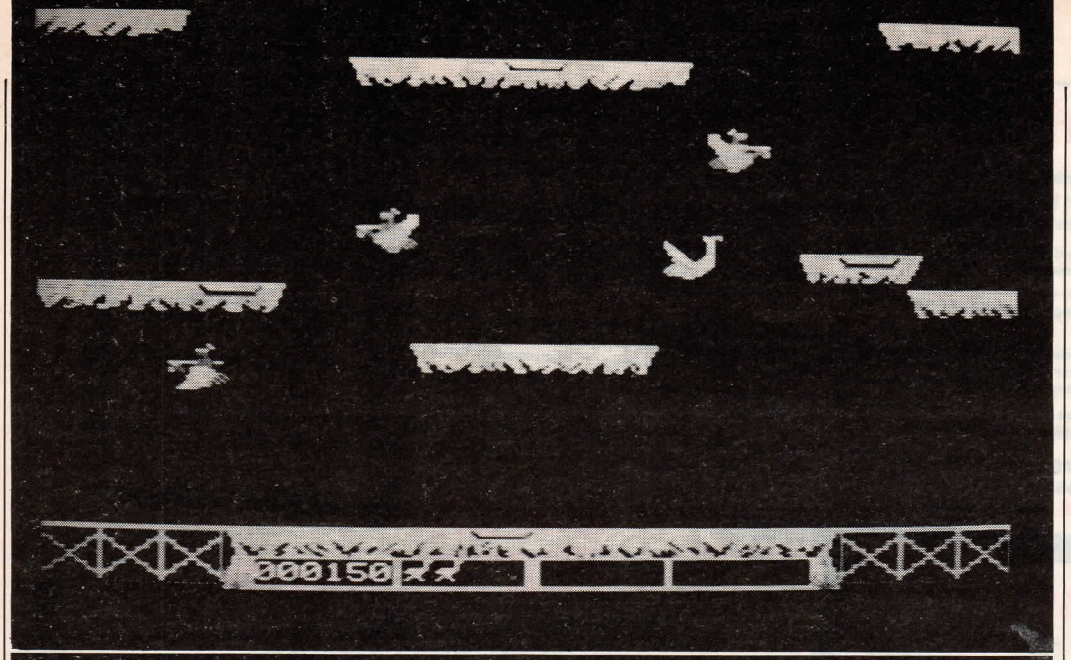
If the computer doubts the validity of one of your words it will ask 'Are you sure?', to which you reply 'Y' if the word exists. If it does not exist, and you press 'N' you forfeit your turn. Alternatively you can ask for a hint, change or juggle your letters and, if necessary, miss your turn.

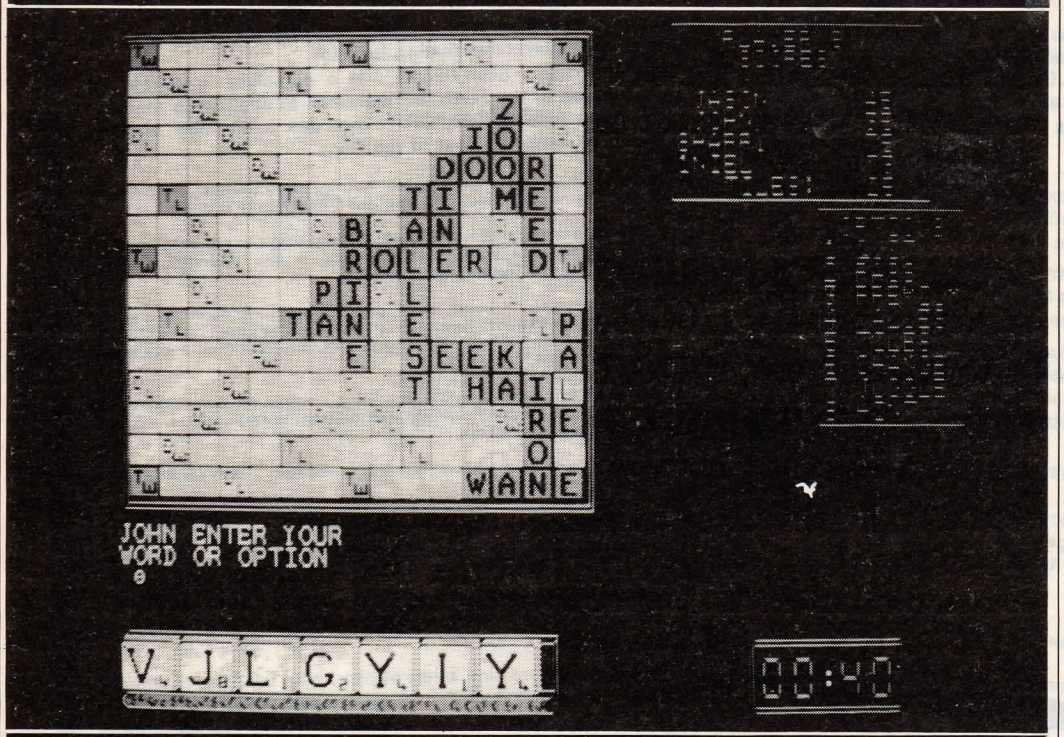
There are a several advantages with Scrabble on the computer, the most obvious being the automatic dictionary check. Again the package is incorrect, the dictionary in fact contains over 20,000 words, not 12,000 as stated. All the scoring and dealing of letters is taken care of, even at the end of the game, and players' scores are always visible, eliminating the need for paper, pens and calculators.

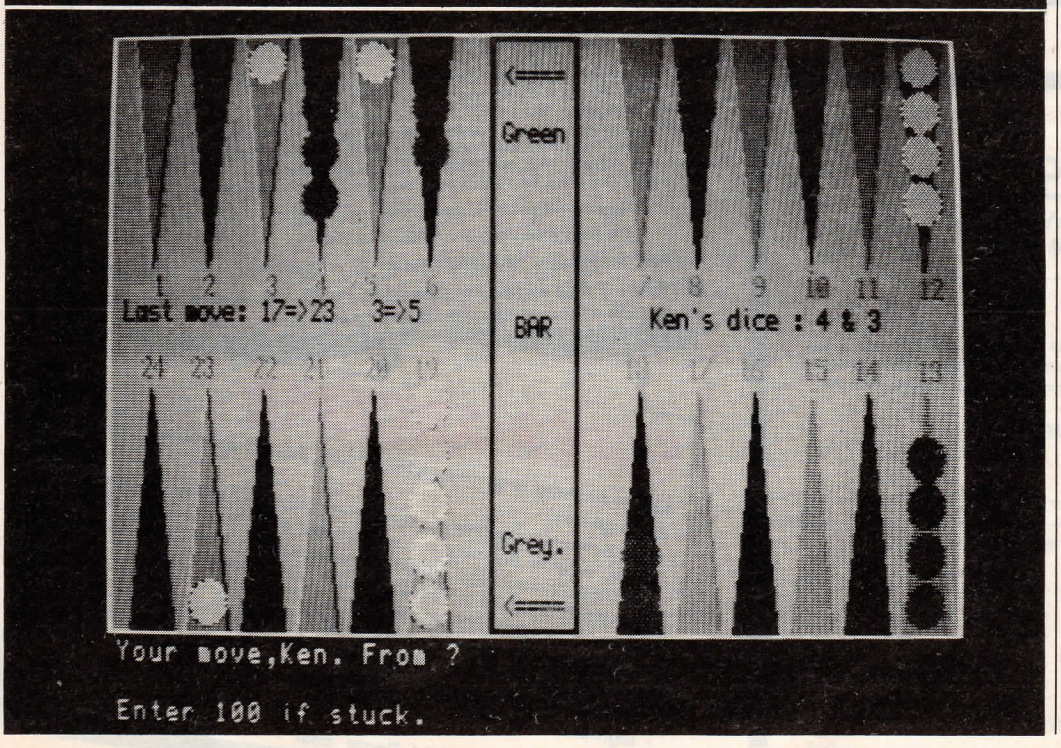
There is one problem, which only comes to light when you play the game. For serious players Scrabble is like a game of Bridge or Poker — it would be fatal to show other players your hand. Unfortunately, with your letters stored by the computer the only way you can view them is on the screen to which other players eyes are glued. The manual says that this will not affect play, but an option is provided which requests each player to press a key before his rack is shown. This allows for one person using the computer at a time, but is not very practical.

Playing two characters myself against the computer, the results were most revealing. The scores were as follows:

QL at level 8 — 179 points
Player 1 (me) — 137 points
Player 2 (me) — 131 points
QL at level 1 — 105 points







Despite its minor limitations Scrabble on the computer was enormous fun and I would recommend it to anyone who enjoys the board game.

Knight Flight? No, it's not a cross between Knight Lore and Flight Simulator, but a fairly original arcade game, particularly for the QL. Sitting astride your faithful ostrich — or is it a pelican? — clad in shining yellow armour and brandishing your lance menacingly, you must do battle with the other Knights of the Kingdom.

Battle involves flying around the screen, crashing into other knights and bouncing off the various platforms. To go up in the air flap your wings using the space bar or fire button. To come down stop flapping. The cursor keys or joystick are used to move left and right, but as usual the fire button on the joystick is a finger killer after a few minutes furious flapping.

In order to kill a Knight you simply have to spear him with your lance, or knock him off his red flamingo. You must therefore be above him, even by the slightest amount, when you crash into one another. If all goes well he will disappear leaving his trusty bird to flap into the distance, but should he be above you, say goodbye to another life.

Stages play an important part in the game — having cleared one wave of Knights the scenario changes slightly and you are faced with another selection from the Round Table. the game is surprisingly addictive, perhaps because of it's originality. It also incorporates some lovely features — as you land on the ground or platform the birds undercarriage comes down like a swan landing on water. When you eventually slide to a halt the bird stands upright until you take off again. In later stages the odd fire breathing dragon appears on the set to harrass you, but in the few stages I managed to pass no seductive maidens appeared!

Knight Flight is available from Real-time Games Software Ltd., Prospect House, 32 Sovereign Street, Leeds LS1 4BT, and costs £14.95.

UPGRADES: Send your original cartridge — not the packaging — plus £5 (£6 if overseas, £10 if Supercharge) for an upgrade to the latest version of any D.P. program.

Super Astrologer de luxe

You don't have to be C-C-C-Claudius to know the value of a good astrologer — and QL Super Astrologer is the definitive character reading and personality delineation package. You need absolutely no knowledge of Astrology to use this system — but it is not a toy as several professional astrologers have been stunned to discover.

This excellent package can cater for any birth-date or time, and any place on earth. Automatic personality comparisons can be performed — ideal for compatibility testing. Sample personality files are provided for lots of famous people, including Prince Charles, Princess Diana, Edison, Hitler, Roosevelt, Queen Victoria, and Freud...

Super Astrologer pushes the QL to its limit. It uses both microdrives and over 120K of data. The 58K machine-code program loads in under ten seconds and performs all calculations quickly and precisely. It gives an amazingly detailed personality readout, spread over 4 single-spaced A4 pages, or on the screen. Working astrologers can customise the text with the editor.

Super Astrologer was designed by a professional astronomer, working with an astrologer and a huge library of books on modern astrological technique. It handles the Natal chart, aspects, progressions, transits etc. Super Astrologer is very accurate and a powerful tool for astronomers as well as astrologers. It does all the Ephemeris calculations at colossal speed, with hosts of useful features including a scale display of planetary positions with variable magnification, interplanetary distance calculator, etc., etc.

"Highly ambitious... the dust hasn't had time to settle on my printer since my friends got wind of this program... it is accurate, comprehensive and easy to use... you certainly will not find as good an astrology program as this on any other home computer". QL WORLD.

We predicted that Super Astrologer would be a massive hit on the QL — and we were right! The new DE LUXE version allows full AND/OR selection in the delineation files, and print-outs of the Natal Chart and Solar System display, with full graphics. Super Astrologer de luxe costs £24.95, with full instructions.

Super Sprite Generator

Super Sprite Generator is a powerful graphic animation package. After over a year of enhancement and revision, Super Sprite Generator version 3.5 must be the Ultimate QL animation system. Super Sprite Generator allows you to create all the high speed, high tension, high drama special effects of arcade and adventure games.

A 'sprite' is an animated graphic symbol — a bird, a plane, Superman or anything else you choose. Multicoloured sprites can be designed with the machine-code sprite editor, and compiled into groups of up to 16 'frames' for automatic animation.

Up to 256 sprites can be held at any time, with 16 moving on screen simultaneously. Ultra-large sprites are allowed. At top speed the motion is faster than the eye can see!

As sprites move around they can be programmed to detect 'collisions' with one another, the border or the background, automatically. Sprites can pass over or under one another, with absolutely no 'flicker' at all. Speeds can be independently set, and sprites can be inverted or reversed at will.

Super Sprite Generator is exceptionally easy to use from SuperBASIC, fast SUPERCHARGED BASIC, or machine code. The new SuperBASIC commands are fully documented and error-trapped. You need no machine code knowledge at all — all the hard work is done for you. You don't even need to be able to draw — lots of demonstration sprites are provided!

"Takes all the hard work out of handling sprites..... results achieved are really excellent", QL USER.

Super Sprite Generator, version 3.5, costs just £24.95.

SUPER FORTH plus Reversi

Forth is a structured, intermediate-level programming language with a cult following. Forth is a remarkable language which combines the speed of machine-code with high-level control constructs and interactive testing facilities.

Gerry Jackson's SUPERFORTH is a complete, ultra-fast implementation of the Forth '83 standard. In addition to the standard commands SUPERFORTH includes a plethora of extra features to make the best of the QL:

- ★ All the QL's features are supported, including sound windows, graphics, disk systems and other peripherals. Input and Output may be re-directed at will.
- ★ Full 32 bit integer arithmetic, allowing lightning-quick calculations to nine digits of precision. All floating-point arithmetic is also supported, including Logarithmic and Trigonometric functions.
- ★ Incredible speed — much faster than any other QL Forth. A Sieve of Erastothenes (the Byte benchmark) runs in just 4 seconds in SUPERFORTH, compared with 3 minutes 30 seconds in QL SuperBASIC (or 3 minutes 10 seconds in IBM PC BASIC!).
- ★ Multi-tasking (demo supplied) with full job control for SUPERFORTH and machine-code programs. SUPERFORTH itself runs as a task, so other programs may run at the same time.
- ★ Built in screen-editor for Forth blocks or named files — alternatively you may use Quill to edit Forth source.

The SUPERFORTH package also includes an extremely powerful implementation of the classic boardgame REVERSI. This superb program demonstrates the speed, flexibility and expressive power of SUPERFORTH. REVERSI is written entirely in SUPERFORTH, and the well-written source-code is supplied for you to study or adapt.

REVERSI 1.4 offers nine levels of play, with near-instantaneous response on levels 1 and 2. Many options enable you to exchange sides, retract moves, set up positions, ask for hints or watch the computer 'think'. Moves can be entered by co-ordinate or simply by 'pointing' at the required position.

The latest version of REVERSI — version 1.4 — is better than ever! It is guaranteed to beat Sinclair Reversi every time, when the two are played on similar levels. It beat the Spectrum champion, MOI Othello, 10-0 in a supervised match — in fact we have yet to find any program, for any personal computer, capable of beating REVERSI on equal time — or any human capable of beating it at its top skill level. This is hardly surprising when you consider that REVERSI 1.4 uses state-of-the-art Artificial Intelligence techniques: alpha-beta tree searching with pruning and a 'killer' heuristic.

"Congratulations on an excellent program", E. Azzo Pardi, Malta.

"The best Forth program", H. Heuss, Berlin.

Digital Precision SUPERFORTH & REVERSI cost £29.95
REVERSI 1.4 is available separately, with full rules and an introduction to the strategies of the game, for £12.95.

SUPER ARCADIA

Super Arcadia is a twin-pack of two superb machine-code arcade games.

BMX Burner is a subtle many-screen collect, detonate and dodge space arcade adventure, with sound-effects and multicolour animated sprites. The puzzles in this program have been carefully crafted to make an addictive and varied game which can be played time and time again.

Grid Racer is a grid-runner/painter game with great sound effects and scrolling windows. Grid Racer is a race against time, chasers and the dreaded Boot! One or two players; microdrive high score table.

BMX Burner and Grid Racer cost £15.95 together

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SUPERCHARGE

Supercharge is a program that translates slow, interpreted SuperBASIC into fast, flexible 68008 machine code — totally automatically. You need no specialised knowledge at all.

Supercharge supports the entire syntax of SuperBASIC. Compiled programs run **incredibly fast**; some run over 100 times faster than in the original SuperBASIC. Microdrive loading times are accelerated by a factor of up to 30. Multitasking is fully supported, and easy to use.

★ ALL Supercharged programs multi-task — you can run any number of them on one QL, simultaneously (RAM permitting)

★ Supercharge supports full floating point arithmetic, to an accuracy of NINE digits (SuperBASIC only displays seven decimal places). Arithmetic is breathtakingly fast — integer handling is often 100 times faster than in interpreted BASIC.

★ Supercharge allows the entire syntax of QL SuperBASIC: file-handling, multi-dimensional arrays, local variables, procedures and functions (with parameters), turtle graphics, windows, both display modes, all devices (including disk drives, modems etc.), sound, graphics, colour, strings, etc., etc.

★ Supercharged programs are reliable on all versions of the QL. Most bugs and restrictions imposed by the SuperBASIC interpreter are corrected or lifted by the compiler. Say goodbye to the integer FOR bug, string and integer SELECT bugs, the CALL bug, the 'too many parameters' bug, the GOSUB in a loop bug, the RESPR bug, etc., etc.

★ Supercharge includes a sophisticated optimiser, which the user can direct to produce either especially compact or fast 68008 machine-code, on a line by line basis.

★ Supercharge is compatible with virtually all QL add-ons, including disk systems, expansion RAM, and **even** add-on commands which do not form a standard part of SuperBASIC! 'Toolkit' utilities work beautifully, so long as they don't try to modify interpreter data-structures (which obviously aren't there). Very few commands do this, and Supercharge generates clear warnings where incompatibilities might exist.

★ Supercharge issues explicit, plain-English reports and warnings, showing the exact position of mistakes. Many 'trivial' errors are automatically corrected!

★ Supercharge is fast, device-independent, concise and easy to use — it even compiled itself!

★ Supercharged programs may be interactively tested 'in slow motion' using the compatible SuperBASIC interpreter.

★ Supercharged programs are protected against unauthorised modification, as they cannot be LISTed. Compiled code loads **incredibly** fast — for instance, a 75K SuperBASIC program loads 25 times faster once compiled.

★ The 105 page Supercharge manual is comprehensive and readable, with tutorial and reference sections, examples, hints and tips, and a full index and glossary.

BASIC compiler

QL SUPERCHARGE is the most sophisticated BASIC compiler ever published. It is the result of 18 months work by a dedicated team of programmers led by Simon Goodwin, a top software designer and journalist.

The verdict from Supercharge users:

"Simple to use ... an excellent product which coped completely with the vagiaries of my own programming", E. Cogswell, Havant.

"Outstanding – the most important piece of QL software so far", Mike Walsh, Birmingham.

The verdict of Sinclair User (March 1986 issue) "A Sinclair User classic" ★ ★ ★ ★ ★

The verdict of QL world incorporating QL user, (March 1986 issue): The arrival of this product is a significant event for the QL, I have no hesitation in recommending Supercharge.

"The manual is very informative and easily read... supercharge is great! Better than I ever expected", R Schubel, New Jersey, USA.

"May I say how pleased I am with Supercharge", Richard Blake, London.

"I was impressed by the quality of the implementation and high degree of compatability with SuperBASIC", T. Gruber, Aachen, W. Germany.

"Very high quality software... a very informative and useful manual", Michael Gottlieb, Edgware.

"Very good and fast in use. You seem to deliver hwat you promise, unlike other QL suppliers, R. Coughian, Liverpool.

"Supercharge is a great improvement on SuperBASIC and has given me new faith in the QL", T. Hansen, Norway.

"I was very surprised by the professional quality — it is really excellent", F. Moya, France.

"Invaluable... I think Supercharge is an excellent product, and the documentation puts Sinclair to shame", Dr K. Williams, Putney.

"The manual is very good. It inspires confidence and has a sense of humour. Supercharge itself is great". H. Gupta, Northampton.

The manual is a model of clarity, readability and accuracy: congratulations! The car on the box should be a Rolls Royce", M. Johnson, London.

"Much more helpful than any previous manual I have ever read", Dr W. Fuggle, Birmingham.

"Easy to use — very well written", J. Hayes, Leeds.

"Very easy to use — very impressive", Dr G. Taylor, Harrow.

"Very impressed — should come as standard with the QL", A. Pritchard, Surrey.

"A credit to British enterprise", Dr Helmut Aigner, Austria.

"Excellent!" — Colin Opie, McGraw Hill; W.D. Software, Jersey; A Dedman, Ipswich; Dr Archer, Wakefield; C. Grogan, Huddersfield; G. Chew. Clwyd; K. Paul, Gerrards Cross; A.B. Steen, Eastleigh, Ingenieurburo Neitzel, Detmold, W. Germany... and many others.

The latest version of Supercharge – version 1.17 – is available as an upgrade, price £10, to users who wish to get the very most from their compiled programs.

Supercharge costs £59.95; this includes the compiler, code-generator, utility programs, add-on commands for task control and error-trapping, demonstration software and over 100 A4 pages of documentation. £5 off SUPERFORTH, £5 off SUPERSPRITE and £2 off Super Monitor + Disassembler when these programs are ordered at the same time as SUPERCHARGE.

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****** SUPERCHARGE + ICE + CHOICE £89.95

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Digital Precision software is available from TBD, Lightning, Creative Sparks, and other distributors of good software. Buyers in Central London can visit Micro-Anvika at 224 Tottenham Court Road.

Supercharge and Superforth are available on 5¼ inch 1440 sector disk at no extra charge.

DEALERS: our discounts are generous — phone us now on 01-527 5493.

PROGRAMMERS: We intend to dominate the QL software market, and we pay excellent royalties for good QL software. Send us a disk or cartridge now, for a prompt, confidential evaluation of work in progress.

Super Backgammon 3.0

Super Backgammon is an excellent machine-code program and a worthy opponent for beginners and experts alike. It has excellent graphics and obeys all the rules of Backgammon (supplied). Super Backgammon plays an aggressive, challenging and entertaining game at all of its six skill levels.

Other features include dual clocks, three playing modes, computerised dice thrower (with optional override if you're suspicious or you want to cheat!), 'Hint' option, evaluation display.

Version 3.0 is very much stronger than its predecessors, and the display has been enhanced to work on all colour or monochrome displays. The upgrade, for existing users, costs £5 upon return of the original cartridge.

"Be warned — the computer will almost certainly beat you!" QL USER.

"The attention to detail evident throughout results in a program that is very enjoyable to use", ELECTRONICS & COMPUTING

Super Backgammon costs £12.95, with full instructions and rules of Backgammon.

QL SUPER MONITOR & Disassembler is a multi-tasking program analysis tool. Test, edit or examine any machine code program with Super Monitor version 3.0 : £18.95

THE P·R·O·G·S

If you've a program that is worthy of consideration, send it to 'The Progs', Sinclair QL World, 79-80 Petty France, London SW1. We pay for everything published at the usual page rates.

Solitare
B Otridge

Another board game, this time for those who prefer to play alone. The rules are very simple. Pegs are removed from the board by jumping over them with adjacent pegs. The object being to remove all but one of the pegs from the board in this fashion. The program includes a demonstration and gives an assessment of your performance ('Very Good, Good' etc) at the end of each game.

```
10 CLS:CSIZE 3,1:PRINT \\"Loading"\"Solitaire":MERGE mdv1_solitaire
100 REMark ****************************
110 REMark ******* SOLITAIRE *******
120 REMark *****  By B Otridge  *****
130 REMark ****************************
140 :
150 :
160 :
170 REMark ********** DATA **********
180 REMark Top-level menu data
190 DATA "CHOOSE 'Game'",4,232,"F1","Help",236,"F2","Demo",240,"F3","Play",27,"E
SC","Quit"
200 REMark In-game menu data
210 DATA "CHOOSE 'Move'",10,192,CHR$(188),"Move Left",200,CHR$(189),"Move Right"
,208,CHR$(190),"Move Up",216,CHR$(191),"Move Down"
220 DATA 194,"CTRL"&CHR$(188),"Jump Left",202,"CTRL"&CHR$(189),"Jump Right",210,
"CTRL"&CHR$(190),"Jump Up",218,"CTRL"&CHR$(191),"Jump Down"
230 DATA 232,"F1","Help",27,"ESC","Quit"
240 REMark Demonstration game data
250 DATA 218,192,192,208,202,200,194,208,208,200,200,218,200,194,194,192,202,208
,208,202,208,218,208,208,192,192,202,216,216,216,216,210,210,208,218,216,200
,200,200,194,200,216,216,210,194,208,218,202,200,194,216,192,192,202,202,200
,194,210,192,192,192,192,216,216,210,202,192,192,192,216,216,210,192,202,200,216
,216,216,216,210,210,194,192,216,216,210,202,200,200,218,216,216,200,194,216,210
,208,200,218,216,210,27
260 REMark End of game comment data
270 DATA "Expert !!!",2,"Excellent !",4,"Good Try",6,"Average Attempt",8,"Below
Average",10,"Poor Show!!",12,"Are you serious ???",45
280 REMark Help screen data
290 DATA "This is a simulation of SOLITAIRE.  The board consists of 45 holes; at
 the start of the game each hole except the centre one contains a peg. The objec
t is to finish with the lowest number of pegs left. Pegs may be removed by one p
eg jumping over another into an empty hole; the 'jumped' peg is then removed."
300 DATA "The cursor keys are used to move the pointer or 'finger' around the bo
ard. A jump may be made by pressing the CTRL key with the appropriate cursor key
: only legal jumps will be accepted. The game may be terminated at any time by p
ressing ESC."
310 REMark Board initial set-up data
320 DATA "                "."      "."     000     "."     000     "."     0
00     "."  0000000000  "."  0000o0000  "
330 :
340 :
350 :
360 REMark ****** MAIN PROGRAM ******
370 MODE 4:setw 0,512,256,0,0,0,0,0,0:setw 0,168,240,329,12,1,4,0,1:setw 0,158,2
30,333,17,1,4,0,0:setw 1,312,240,17,12,2,0,6,1
380 q$=CHR$(10):set_board
390 REPeat games
400 choose game$
410 IF game$="Help":display_help "game"
420 IF game$="Demo" OR game$="Play":do_game
430 IF game$="Quit":EXIT games
440 END REPeat games
450 ende:STOP
460 :
470 :
480 :
490 REMark ******** SET_BOARD ********
500 DEFine PROCedure set_board
510 DIM grid_a$(13,13):DIM grid_d$(13,13):RESTORE 320:FOR n=1 TO 7:READ a$:grid_
a$(n)=a$:grid_d$(n)=a$:grid_a$(14-n)=a$:grid_d$(14-n)=a$
520 no_pegs=44:ptr_a=7:ptr_d=5:pointer$="\ ":old_ptr_a=7:old_ptr_d=5:CLS
530 FOR n=3 TO 11
540 i=(n<6 OR n>8)
550 FOR m=3+3*(i) TO 11-3*(i):CURSOR m*32-74,n*24-54:INK 4+2*(grid_a$(n,m)="0"):
PRINT grid_a$(n,m)
560 END FOR n
570 game$="":CURSOR ptr_a*32-88,ptr_d*24-63:PRINT pointer$:set_menu "game"
580 END DEFine
590 :
600 :
610 :
620 REMark ******** SET_MENU ********
630 DEFine PROCedure set_menu(menu$)
640 IF menu$="game":RESTORE 190
650 IF menu$="move":RESTORE 200
660 READ a$:CLS#0:CSIZE#0,2,1:PRINT#0,"  SOLITAIRE":CSIZE #0,2,0:UNDER#0,1:PRINT
#0,a$\\:UNDER#0,0:CSIZE#0,1,0:READ no
670 DIM b$(3,no,9):FOR n= 1 TO no
680 READ i:b$(1,n)=CHR$(i):READ b$(2,n):READ b$(3,n):PRINT#0,TO (6-LEN(b$(2,n)))
:b$(2,n);TO 7:b$(3,n)
690 END FOR n
700 END DEFine
710 :
720 :
730 :
740 REMark ********* CHOOSE *********
750 DEFine PROCedure choose (choice$)
760 REPeat get_choice
770 i=KEYROW(0):IF game$<>"Demo":i$=INKEY$(-1):ELSE :i=KEYROW(1):IF i=8:i$=CHR$(
27):ELSE :READ i:i$=CHR$(i)
780 FOR n=1 TO no:IF i$=b$(1,n):choice$=b$(3,n):RETurn
790 END REPeat get_choice
800 END DEFine
810 :
820 :
830 :
840 REMark ****** DISPLAY_HELP ******
850 DEFine PROCedure display_help (level$)
860 RESTORE 290:IF level$="move":RESTORE 300
870 READ a$:prinw a$
880 set_menu level$
890 END DEFine
900 :
910 :
920 :
930 REMark ******** DO_GAME *********
940 DEFine PROCedure do_game
950 game_end=0:move$="":set_menu "move":IF game$="Demo":INK#0,6:prin q$&q$&"This
 is a demonstration of SOLITAIRE, press <ESC> key to terminate. ":INK#0,0:RESTOR
E 250
960 REPeat moves:do_move:IF game_end:EXIT moves
970 n=1:RESTORE 270:REPeat ab:READ a$:READ m:IF no_pegs<m:EXIT ab:ELSE n=m
980 CLS#0:CSIZE#0,1,1:prinw "You have finished this game with "&no_pegs&" pegs l
eft. "&q$&q$&a$:CSIZE#0,1,0
990 set_board
1000 END DEFine
1010 :
1020 :
1030 :
1040 REMark ******** DO_MOVE ********
1050 DEFine PROCedure do_move
1060 old_ptr_a=ptr_a:old_ptr_d=ptr_d:no_move=0
1070   REPeat valid_move
1080     pick=0:valid=0:choose a_move$
1090     IF a_move$="Help":display_help "move"
1100     IF a_move$="Quit":game_end=1:RETurn
1110     IF a_move$="Move Left":IF grid_a$(ptr_d,ptr_a-1)<>" ":ptr_a=ptr_a-1:val
id=1:incr=-8
1120     IF a_move$="Move Right":IF grid_a$(ptr_d,ptr_a+1)<>" ":ptr_a=ptr_a+1:va
lid=1:incr=8
1130     IF a_move$="Move Down":IF grid_a$(ptr_d+1,ptr_a)<>" ":ptr_d=ptr_d+1:val
id=1:incr=6
1140     IF a_move$="Move Up":IF grid_a$(ptr_d-1,ptr_a)<>" ":ptr_d=ptr_d-1:valid
=1:incr=-6
1150     IF a_move$(1 TO 4)="Jump" AND grid_a$(ptr_d,ptr_a)="0"
1160       pick=1
1170       IF a_move$="Jump Left":IF grid_a$(ptr_d,ptr_a-1)="0" AND grid_a$(ptr_
d,ptr_a-2)="o":ptr_a=ptr_a-2:valid=1:incr=-4
1180       IF a_move$="Jump Right":IF grid_a$(ptr_d,ptr_a+1)="0" AND grid_a$(ptr
_d,ptr_a+2)="o":ptr_a=ptr_a+2:valid=1:incr=4
1190       IF a_move$="Jump Down":IF grid_a$(ptr_d+1,ptr_a)="0" AND grid_a$(ptr_
d+2,ptr_a)="o":ptr_d=ptr_d+2:valid=1:incr=4
1200       IF a_move$="Jump Up":IF grid_a$(ptr_d-1,ptr_a)="0" AND grid_a$(ptr_d-
2,ptr_a)="o":ptr_d=ptr_d-2:valid=1:incr=-4
1210     END IF
1220     IF LEN(a_move$)>6:a_move$=a_move$(6 TO)
1230     IF valid:EXIT valid_move
1240   END REPeat valid_move
1250 IF pick:pegupdn old_ptr_a,old_ptr_d,pointer$:no_pegs=no_pegs-1
1260 IF a_move$="Lert" OR a_move$="Right":x=ptr_d*24-63:FOR n=old_ptr_a*32-88 TO
 ptr_a*32-88 STEP incr:CURSOR n-incr,x:PRINT " ":CURSOR n,x:PRINT pointer$(2):OV
ER 1:CURSOR n,x:PRINT pointer$(1):OVER 0
1270 IF a_move$="Up" OR a_move$="Down":x=ptr_a*32-88:FOR n=old_ptr_d*24-63 TO pt
r_d*24-63 STEP incr:CURSOR x,n-incr:PRINT " ":CURSOR x,n:PRINT pointer$(2):OVER
1:CURSOR x,n:PRINT pointer$(1):OVER 0
1280 IF pick
1290   INK 4
1300   IF a_move$="Left":grid_a$(ptr_d,ptr_a TO ptr_a+2)="0oo":grid_d$(ptr_a,ptr
_d)="0":grid_d$(ptr_a+1,ptr_d)="o":grid_d$(ptr_a+2,ptr_d)="o":CURSOR ptr_a*32-42
,ptr_d*24-54:PRINT "o"
1310   IF a_move$="Right":grid_a$(ptr_d,ptr_a-2 TO ptr_a)="oo0":grid_d$(ptr_a,pt
r_d)="0":grid_d$(ptr_a-1,ptr_d)="o":grid_d$(ptr_a-2,ptr_d)="o":CURSOR ptr_a*32-1
06,ptr_d*24-54:PRINT "o"
1320   IF a_move$="Down":grid_d$(ptr_a,ptr_d-2 TO ptr_d)="o0o":grid_a$(ptr_d,ptr
_a)="0":grid_a$(ptr_d-1,ptr_a)="o":grid_a$(ptr_d-2,ptr_a)="o":CURSOR ptr_a*32-74
,ptr_d*24-78:PRINT "o"
1330   IF a_move$="Up":grid_d$(ptr_a,ptr_d TO ptr_d+2)="0oo":grid_a$(ptr_d,ptr_a
)="0":grid_a$(ptr_d+1,ptr_a)="o":grid_a$(ptr_d+2,ptr_a)="o":CURSOR ptr_a*32-74,p
tr_d*24-30:PRINT "o"
1340   INK 6:pegupdn ptr_a,ptr_d,pointer$
1350   no_move=1:test_move grid_a$:IF no_move:test_move grid_d$
1360 END IF
1370 IF no_move:game_end=1:RETurn
1380 END DEFine
1390 :
1400 :
1410 :
1420 REMark ******** TEST_MOVE ******
1430 DEFine PROCedure test_move(gc$)
1440 LOCal n
1450 FOR n=3 TO 11:IF ("o00" INSTR gc$(n)) OR ("00o" INSTR gc$(n)):no_move=0:RET
urn
1460 END DEFine
1470 :
1480 :
1490 :
1500 REMark ******* PEGUPDN *********
1510 DEFine PROCedure pegupdn (a,d,pt$)
1520 m=a*32-88:FOR n=d*24-62 TO d*24-54 STEP 2:CURSOR m,n-2:PRINT " ":m=m+3.11:C
URSOR m,n:PRINT pt$(1):OVER 1:CURSOR m,n:PRINT pt$(2):OVER 0
1530 CURSOR m,n:PRINT " "
1540 IF pt$="\ ":pt$="\0":r$="o":ELSE :pt$="\ ":r$="0"
1550 m=a*32-74:mm=m:nn=d*24-54:FOR n=nn-1 TO nn-9 STEP -2:CURSOR m,n-4:PRINT " "
:m=m-2.8:CURSOR m,n:PRINT pt$(2):OVER 1:CURSOR m,n:PRINT pt$(1):OVER 0:CURSOR mm
,nn:INK 4+2*(r$="0"):PRINT r$:INK 6
1560 CURSOR m,n:PRINT "\ "
1570 END DEFine
1580 :
1590 :
1600 :
1610 REMark ********** SETW *********
1620 DEFine PROCedure setw (ch,wi,de,x,y,cs,pa,in,bo):WINDOW #ch,wi,de,x,y:CSIZE
#ch,cs,0:PAPER#ch,pa:CLS#ch:INK#ch,in:BORDER#ch,bo,0,6:END DEFine
```

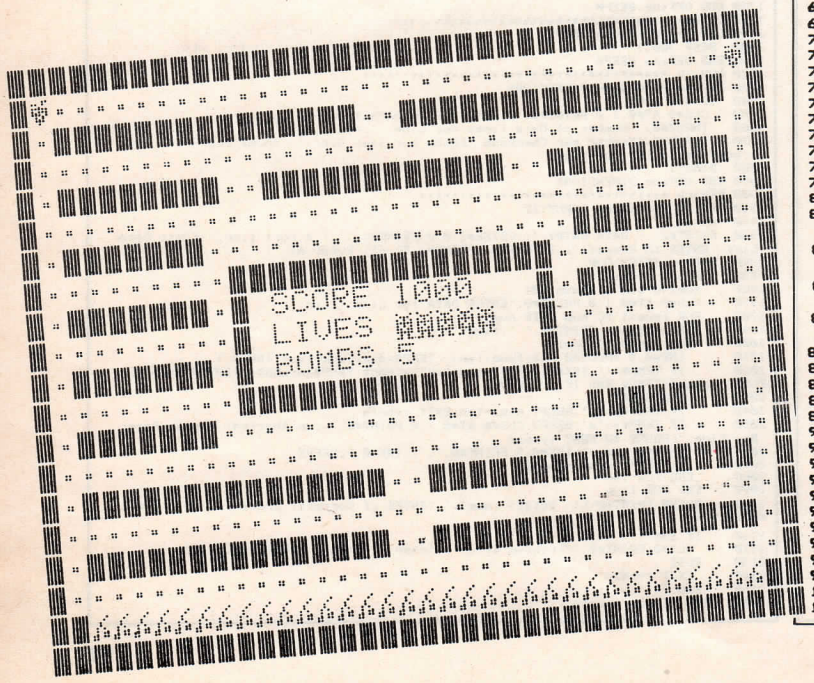
```
1630 :
1640 :
1650 :
1660 REMark ********* PRIN **********
1670 DEFine PROCedure prin (c$):LOCal st,n
1680 st=1:FOR n=1 TO LEN(c$):IF c$(n)=" ":IF n>st:PRINT#0;!c$(st TO n-1);:st=n+1
1690 IF n>=st:PRINT#0;!c$(st TO n)
1700 END DEFine
1710 :
1720 :
1730 :
1740 REMark ********* PRINW *********
1750 DEFine PROCedure prinw (z$):CLS#0:prin z$&" "&q$&q$:FOR n=1 TO 200:i$=INKEY
$(0)
1760 prin "Press any key to continue ":z$=INKEY$(-1):CLS#0:END DEFine
1770 :
1780 :
1790 :
1800 REMark ********* ENDE **********
1810 DEFine PROCedure ende:setw 0,512,256,0,0,0,0,0,0:setw 1,168,30,172,170,2,7,
0,5:PRINT "F1...monitor"\"F2...TV":REPeat g:n=CODE(INKEY$(-1)):IF n>231:EXIT g
1820 IF n=232:setw 0,512,50,0,206,0,0,6,0:setw 1,256,202,256,0,0,2,6,1:setw 2,25
6,202,0,0,0,6,0,1:MODE 4:ELSE :setw 0,448,40,32,216,2,0,7,0:setw 2,448,200,32,16
,2,1,7,0:setw 1,448,200,32,16,2,2,7,0:MODE 8
1830 END DEFine
```

Hex Loader
R Williams

Those of you who are doonted by the prospect of entering Progs listings containing extensive data statements will find this a very useful utility. The program allows you to enter data from the keyboard, or a microdrive file and pokes it directly into memory. The line number and address of the poked entries is listed to the screen so changes can be made if required. Lines containing repetitions of the same number can be easily entered by inputting the first item and pressing return for each subsequent repetition. The part finished or complete file is saved to microdrive for later use; it being loaded in the usual way.

```
100 REMark MACHINE CODE HEX DATA PROGRAM
110 REMark RICHARD WILLIAMS  27/11/85
120 MODE 4:WINDOW#0,492,51,10,205:INK#0,7:CSIZE#0,1,0
130 WINDOW#2,504,205,4,0:PAPER#2,5:CLS#2
140 WINDOW#2,504,14,4,0:PAPER#2,2:INK#2,7:BORDER#2,1,7:CLS#2
150 WINDOW#2,500,10,6,2:BORDER#2,0,0
160 WINDOW 488,182,12,18:BORDER 1,0
170 WINDOW 484,180,14,19
180 OPEN#5,scr_130x20a12x236:INK#5,5:PAPER#5,2:CLS
190 CSIZE#2,1,0:PRINT#2, TO 14; 'Machine Code Hex Data Program'
200 MAIN
210 REMark ********************************
220 DEFine PROCedure MAIN
230  CLEAR:Poking=0:lin=1000:Max_line=0:FOPEN=0:A=0:num=0:DIMS=0:AP=1
240  CLS:CLS#0:PRINT#0,"POKE DATA:":PRINT#0," 'P'oke;  Poke_'W';  Poke_'L' ?"::E
NTER
250  IF AN$ INSTR 'PpWwLl'=0: GO TO 300
260  INPUT#0,'   Enter Respr: ':res::base=RESPR(res):A=base
270  PRINT#0,' = ';base;::PAUSE 40:Poking=1
280  IF AN$=='W':AP=2
290  IF AN$=='L':AP=4
300  CLS#0:AT#0,1,0: PRINT#0, "'I'nput Existing Data File or 'S'tart New Data Fi
le?":BEEPX
310  LET AN$=INKEY$(-1)
320  IF AN$ INSTR 'IiSs'=0:GO TO 310
330  IF AN$=='I':DIR mdv1_:EXISTING:OPEN_IT:STORE:ELSE :OPEN_IT
340  IF FOPEN
350   IF Max_line>0
360    CLS
370    IF Max_line>16
380     PRINT x$(Max_line-16 TO Max_line-1)
390    ELSE
400     PRINT x$( TO Max_line-1)
410    END IF
420    PRINT x$(Max_line);' < Last Existing Line'
430  END IF
440  CLS#2:PRINT#2,' DATA ENTRY':BEEPT
450  CLS#0:AT#0,1,0:INPUT#0, 'NEW DATA:'\'Start Line Number (ENTER if no new da
ta): ';LIN$:BEEPX:IF LIN$='':GO TO 470:ELSE :lin=LIN$
460  A1=A:WHOLE=1:DIMENSIONS:INPUT_IT
470  CLS#2:PRINT#2,' Closing Data File: ':name$:CLOSE#3:FOPEN=0
480  CLS#0:AT#0,1,0:PRINT#0,"'B'ackup Data File?":ENTER
490  IF AN$=='b'
500    CLS#0:AT#0,1,0:FLASH#0,1:PRINT#0,'Put Backup in MDV2 - Any key to go on..
.':FLASH#0,0:PAUSE
510    CLS#2:PRINT#2,' Copying Data File from MDV1 to MDV2':DELETE 'mdv2_'&name$
&'_mcdf':COPY 'MDV1_'&name$&'_mcdf' TO 'MDV2_'&name$&'_mcdf'
520   END IF
530  END IF
540  IF Poking
550   CLS#0:AT#0,1,0:PRINT#0,"'S'EXEC Code?":ENTER
560   IF AN$=='s'
570    CLS:DIR mdv1_
580    CLS#0:AT#0,1,0:INPUT#0,"Name of EXEC File (Mdv1_*_exec): ";name$
590    INPUT#0,'Enter Data_Space: ';ds
600    UPPER name$:CLS#2:PRINT#2,' SEXEC MDV1_';name$;'_exec';',';base;',';res;'
,';ds
610    DELETE 'mdv1_'&name$&'_exec':SEXEC 'mdv1_'&name$&'_exec',base,res,ds
620    CLS#0:AT#0,1,0:PRINT#0,"'B'ackup SEXEC File?":ENTER
630    IF AN$=='b'
640     CLS#0:AT#0,1,0:FLASH#0,1:PRINT#0,'Put Backup in MDV2 - Any key to go on>
':FLASH#0,0:PAUSE
650     CLS#2:PRINT#2," Backing Up Sexec File":DELETE 'mdv2_'&nayms&'_exec':SEXE
C 'mdv2_'&nayms&'_exec',res,A,ds
660    END IF
670   END IF
680  END IF
690  CLS#0:AT#0,1,0:PRINT#0, "'F'urther Data Entry?":ENTER
700  IF AN$=='F'
710   MAIN
720  ELSE
730   CLS#0:AT#0,1,0:PRINT#0,"Data List can be LOADED/MERGED for insertion into
a Program."\" or this program can be used to POKE and/or alter Data List.":CSIZE
#0,0,0
740   STOP
750  END IF
760 END DEFine MAIN
770 REMark ********************************
780 DEFine PROCedure EXISTING
790  first=1:first$='':LIN$='':LAST$='':A1=A
800  ENTER_NAME
810  AT#0,1,0:INPUT#0,'Existing File Name (Mdv1_*_mcdf): ';nayms:UPPER nayms
820  IF nayms='?':CLS:DIR mdv1_:GO TO 810
830  IF nayms='':RETurn :ELSE :OPEN_IN#4,'mdv1_'&nayms&'_mcdf'
840  Max_line=1:MAX_LEN=0
850  REPeat LOOK
860   INPUT#4,d$:IF EOF(#4):EXIT LOOK
870   IF d$='':NEXT LOOK
880   IF LEN(d$)>MAX_LEN:MAX_LEN=LEN(d$)
890   Max_line=Max_line+1
900  END REPeat LOOK
910  CLOSE#4
920  DIM x$(Max_line,MAX_LEN+10)
930  OPEN_IN#4,'mdv1_'&nayms&'_mcdf':CLS:CLS#0:PRINT#2, ' Listing from Mdv1_':na
ym$;'_mcdf';:IF Poking:PRINT#2, TO 49;'POKED AT:'
940  FOR LOOK=1 TO Max_line
950   IF EOF(#4):Max_line=LOOK:EXIT LOOK
960   INPUT#4,d$:IF LEN(d$)<1:LOOK=LOOK-1:NEXT LOOK
970   x$(LOOK)=d$:PRINT d$;:IF Poking:PRINT TO 65,A1;
980   IF first
990    FOR Z=1 TO LEN(d$)
1000     IF d$(Z)=' ':EXIT Z
1010     first$=first$&d$(Z)
1020    END FOR Z
1030   first=0
1040   END IF
1050   FOR Z=1 TO LEN(d$)
1060    IF d$(Z)=' ':EXIT Z
1070    LIN$=LIN$&d$(Z)
1080   END FOR Z
1090   IF Poking:POKE_IT:A1$=A1-AP:PRINT '-';A1$(5 TO 6):ELSE :PRINT
1100  END FOR LOOK
1110  CLOSE#4:A=A1
1120  CLS#0:AT#0,1,0:PRINT#0,"'C'heck/Alter Existing Lines?":ENTER
1130  IF AN$=='c':CHANGE IT
1140 END DEFine EXISTING
1150 REMark ****************************
1160 DEFine PROCedure CHECK_IT
1170  FOR Z=1 TO LEN(TEMP$)
1180   IF TEMP$(Z) INSTR '0123456789AaEe-'=0:PRINT#0,'Error ':BEEPU:GO TO 540
1190  END FOR Z
1200 END DEFine CHECK_IT
1210 REMark ************************
1220 DEFine PROCedure POKE_IT
1230  FOR Z=1 TO LEN(d$)
1240   IF d$(Z TO Z+3)='DATA':NEXT Z
1250   temp=Z+5:EXIT Z
1260  END FOR Z
1270  NUMBER=0:NUMBER$='':MINUS=0
1280  FOR Z=temp TO LEN(d$)
1290   IF d$(Z)='-':MINUS=1
1300   IF d$(Z) INSTR '0123456789':NUMBER$=NUMBER$&d$(Z):NUMBER=NUMBER$
1310   IF d$(Z)=',' OR Z=LEN(d$)
1320    IF MINUS:NUMBER=-NUMBER:MINUS=0
1330    IF AP=1:POKE A1,NUMBER
1340    IF AP=2:POKE_W A1,NUMBER
1350    IF AP=4:POKE_L A1,NUMBER
1360    A1=A1+AP:temp=Z+1:NUMBER=0:NUMBER$=''
1370   END IF
1380  END FOR Z
1390 END DEFine POKE_IT
1400 REMark ******************************************
1410 DEFine PROCedure CHANGE_IT
1420  DIMENSIONS:prem=first$
1430  REPeat CHECKING
1440   CLS#0:AT#0,1,0:PRINT#0,"'C'heck line by line + checksum?":ENTER
1450   IF AN$=='c'
1460   CLS#0:AT#0,1,0:PRINT#0,"'E'xit Listing; '?' to View Next Line":CLS
1470    FOR LOOK=1 TO Max_line
1480     d$=x$(LOOK):SPLIT_IT
1490     PRINT x$(LOOK);' = ';TOTAL:AN$=INKEY$(-1):IF AN$=='E':EXIT LOOK
1500    END FOR LOOK
1510   END IF
1520   CLS#0:AT#0,1,0:INPUT#0,'Enter Line to be Changed (or ENTER to Exit):  ';n
c$
1530   IF KEYROW(1) AND nc$='':IF KEYROW(1)=1:REturn :ELSE :GO TO 1520
1540   FOR Z=1 TO LEN(nc$)
1550    IF nc$(Z) INSTR '0123456789':=0:GO TO 1520
1560   END FOR Z
1570   nc=nc$:lin=nc:LIN$=lin:CLS
1580   nc=(nc-prem)/10:PRINT x$(nc+1)
1590   IF Poking:A1=(base+(nc*(num*AP)))
1600   WHOLE=0:INPUT_IT
1610   x$(nc+1)=DATAL$
1620   IF Poking:d$=x$(nc):POKE_IT
1630   CLS#0:AT#0,1,0:PRINT#0, "'C'ontinue Alterations." :ENTER:IF AN$=='c':NEXT
 CHECKING:ELSE :EXIT CHECKING
1640  END REPeat CHECKING
1650 END DEFine CHANGE_IT
1660 REMark ****************************
1670 DEFine PROCedure BEEPT
1680  BEEP 5000,5:PAUSE 5:BEEP 5000,10
1690 END DEFine BEEPT
1700 REMark %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
1710 DEFine PROCedure BEEPU
1720   BEEP 4000,200
1730 END DEFine BEEPU
1740 REMark %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
1750 DEFine PROCedure BEEPW
1760  BEEP 3000,1,255,200,4,2
1770 END DEFine BEEPW
1780 REMark %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
1790 DEFine PROCedure BEEPX
1800  BEEP 300,1
1810 END DEFine BEEPX
1820 REMark **********************************
1830 DEFine PROCedure DIMENSIONS
1840  IF NOT DIMS
1850   CLS#0:AT#0,1,0:PRINT#0,'DIMENSIONS OF DATA ENTRIES:'
1860   INPUT#0, 'Number of Data Items per Line: ';num:BEEPX
1870   INPUT#0,'Number per Checksum (ENTER for Same None): ';num$:BEEPX:IF num$=
'':num=num1:ELSE :num=num$
1880   DIMS=1
1890 END DEFine DIMENSIONS
1900 REMark ****************************
1910 DEFine PROCedure INPUT_IT
1920  A2=A1
1930  PRINT#2, ' DATA ENTRY:';:CSIZE#2,0,0:PRINT#2,   ('A'bort line; 'E'xit Data
 List; ENTER to Repeat)";:IF Poking:PRINT#2,TO 65;'POKED AT:'
1940  REPeat ENTRYLOOP
1950   REPeat typein
1960    sum1=0:DIM di$(num,10)
1970    CLS#0:AT#0,1,0:PRINT#0,'ENTER DATA for Line ';lin;':'
1980    FOR fsum=1 TO num STEP num1
1990     IF num1>num:PRINT#0,' ';fsum;')';
2000     FOR lyn=0 TO num1-1
2010      INK#0,5:INPUT#0,di$(fsum+lyn);:TEMP$=di$(fsum+lyn):INK#0,7
2020      IF TEMP$='':INK#0,5:di$(fsum+lyn)=atemp$:TEMP$=atemp$:PRINT#0,atemp$;:
ELSE :atemp$=TEMP$:END IF  :INK#0,7
2030       CHECK_IT
2040       IF TEMP$=='E':BEEPT:num1=lyn:EXIT typein
2050       IF TEMP$=='a':BEEPU:CLS#0:AT#0,1,0:PRINT#0,"Line Aborted! Please Enter
 New Line.":PAUSE 40:NEXT typein
2060       IF lyn<num1-1:INK#0,5:PRINT#0,',';:INK#0,7:BEEPX
2070        di=TEMP$:sum1=sum1+di
2080      END FOR lyn
2090     END FOR fsum
2100     BEEPW:PRINT#0\\'  Total=';sum1;' (ENTER if Correct; SPACE if not)':AN$=I
NKEY$(-1)
2110     IF AN$==' '
2120      CLS#0:PRINT#0,'Checksum Error! Please re-enter.':BEEPU:PAUSE 50
2130     ELSE
2140      EXIT typein
2150     END IF
2160    END REPeat typein
```

```
2170   FOR lyn=0 TO (num-1) STEP 10
2180    DATAL$=LIN$&' DATA '
2190    FOR DATAL=1 TO num1
2200     IF Poking:poke_word=di$(DATAL+lyn):POKE A1,poke_word:A1=A1+AP
2210     IF DATAL<num1:DATAL$=DATAL$&di$(DATAL+lyn)&',':ELSE DATAL$=DATAL$&di$(D
ATAL+lyn)
2220    END FOR DATAL
2230    A1$=A1-AP
2240    PRINT DATAL$;:IF Poking:PRINT TO 65;A2;'-';A1$(5 TO 6):ELSE :PRINT
2250    BEEPT:lin=lin+10:LIN$=lin:IF FOPEN:PRINT#3,DATAL$
2260   END FOR lyn
2270   IF NOT WHOLE:RETurn :ELSE :A=A1
2280   IF TEMP$=='E':EXIT ENTRYLOOP
2290  END REPeat ENTRYLOOP
2300  A1$=A1-AP
2310 END DEFine INPUT_IT
2320 REMark **********************************
2330 DEFine PROCedure OPEN_IT
2340  IF FOPEN:RETurn :ELSE :FOPEN=1
2350   CLS#0:CLS:DIR mdv1_:ENTER_NAME
2360   AT#0,1,0: BEEPT:INPUT#0,'Destination Data File Name (mdv1_*_mcdf): ':name
$:UPPER name$:IF name$='':FOPEN=0:RETurn
2370   IF name$='?':CLS:DIR mdv1_:GO TO 2360
2380   DELETE 'MDV1_'&name$&'_mcdf':OPEN_NEW#3,'mdv1_'&name$&'_mcdf'
2390 END DEFine OPEN_IT
2400 REMark **********************************
2410 DEFine PROCedure STORE
2420  IF FOPEN:PRINT#3,x$
2430 END DEFine STORE
2440 REMark **********************************
2450 DEFine PROCedure ENTER
2460  CLS#5:PRINT#5,'Type Letter to SELECT"\" or ENTER to Go On...':BEEPT
2470  AN$=INKEY$(-1)
2480 END DEFine ENTER
2490 REMark **********************************
2500 DEFine PROCedure UPPER(STR$)
2510  LOCal F
2520  FOR TEST=1 TO LEN(STR$)
2530   F=CODE(STR$(TEST))
2540   IF F>96 THEN STR$(TEST)=CHR$(F-32)
2550  END FOR TEST
2560 END DEFine UPPER
2570 REMark ************************
2580 DEFine PROCedure ENTER_NAME
2590  CLS#0:PAPER#0,2
2600  AT#0,3,0:PRINT#0,"Enter Name or '?' for Dir "\'Type ENTER to go on...
2610  PAPER#0,0
2620 END DEFine ENTER_NAME
2630 REMark **********************************
2640 DEFine PROCedure SPLIT_IT
2650  TOTAL=0
2660  FOR Z=1 TO LEN(d$)
2670   IF d$(Z TO Z+3)<>'DATA':NEXT Z
2680   temp=Z+5:EXIT Z
2690  END FOR Z
2700  NUMBER=0:NUMBER$='':MINUS=0
2710  FOR Z=temp TO LEN(d$)
2720   IF d$(Z)='-':MINUS=1
2730   IF d$(Z) INSTR '0123456789':NUMBER$=NUMBER$&d$(Z):NUMBER=NUMBER$
2740   IF d$(Z)=',' OR Z=LEN(d$)
2750    IF MINUS:NUMBER=-NUMBER
2760    TOTAL=TOTAL+NUMBER:NUMBER=0:NUMBER$='':MINUS=0
2770    temp=Z+1
2780   END IF
2790  END FOR Z
2800 END DEFine SPLIT_IT
2810 REMark ****************************************
2820 DEFine PROCedure SAV
2830  LOCal FLN$
2840  CLS#0:PRINT#0, 'SAVE PROGRAM TO MDV1 & 2':INPUT#0,'FILE NAME: ':FLN$
2850  INPUT#0,'Save From Line (ENTER for first): ':savfrom$:IF savfrom$='':savfr
om=1:ELSE :savfrom=savfrom$
2860  INPUT#0,'                To (ENTER for last): ':savto$:IF savto$='':savto=327
67:ELSE :savto=savto$
2870  CLS#0:PRINT#0, 'SAVING MDV1_':FLN$!savfrom!'TO'!savto
2880  DELETE 'MDV1_'&FLN$:SAVE 'MDV1_'&FLN$,savfrom TO savto
2890  PRINT#0,'SAVING MDV2_':FLN$!savfrom!'TO'!savto
2900  DELETE 'MDV2_'&FLN$:SAVE 'MDV2_'&FLN$,savfrom TO savto
2910 END DEFine
2920 REMark ********************************
```



Hungry Harry

J M Dower

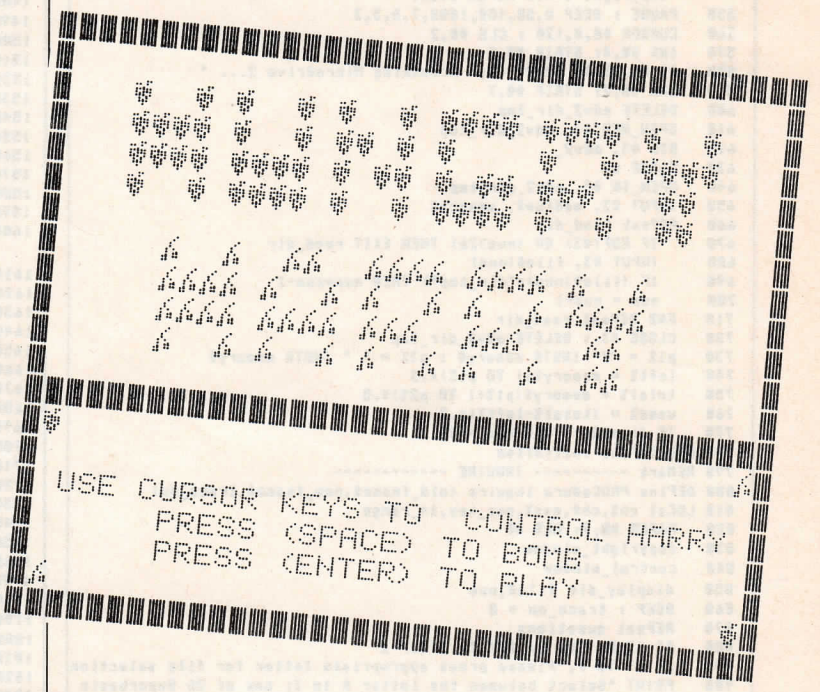
This is a simple, yet interesting implementation of the familiar 'chase and munch' games found on all good micros. We've included it because of few lines utilised and the effective results.

Don't expect a fully flung machine code spectacular, but it's worth typing in. Type DEFCHAR to set up the graphics prior to running the program.

```
100 REMark ****************
110 REMark * HUNGRY HARRY *
120 REMark *PROGRAMMED FOR*
130 REMark * THE SINCLAIR *
140 REMark *      QL      *
150 REMark * BY J.M.DOWER *
160 REMark ****************
170 :
180 TITLE_PAGE
190 DEFine PROCedure TITLE_PAGE
200 PAPER 0:CLS:PAPER #0,0:CLS #0
210 SHEET=1:sheets
220 INK 4:AT 15,2:PRINT "USE CURSOR KEYS TO  CONTROL HARRY"
230 AT 16,7:PRINT "PRESS (SPACE) TO BOMB"
240 AT 17,7:PRINT "PRESS (ENTER) TO PLAY"
250 key=KEYROW(1):IF key=1 THEN init:ELSE GO TO 250
260 END DEFine TITLE_PAGE
270 DEFine PROCedure init
280 PAPER #0,0:CLS #0:PAPER 0:CLS:SHEET=2:HIGH=2000
290 score=0:lives=3:count=0:BOMBS=5
300 SCREEN_INIT
310 END DEFine init
320 DEFine PROCedure update
330 AT 9,18:INK 2:PRINT FILL$("@",lives) &" "
340 AT 8,18:INK 2:PRINT score
350 AT 10,18:INK 2:PRINT BOMBS
360 END DEFine update
370 x=19:y=7
380 MONA=18:MONb=15
390 REPeat main
400 FOR loop=1 TO 2
410 xx=x:yy=y
420 key=KEYROW(1)
430 IF key  THEN moveyou
440 c$=scr$(y,x)
450 IF c$="." THEN BEEP 200,0:AT y-1,x-1:PRINT " ":score=score+5:
    update:scr$(y,x
)=" ":count=count+1:IF key THEN moveyou
460 IF c$="[" THEN BEEP 500,100:AT y-1,x-1:PRINT"
    ":score=score+50:update:scr$(y ,x)=" ":IF key THEN moveyou
470 IF c$="+" THEN BEEP 500,0:AT y-1,x-1:PRINT" ":score=score+50:
    update:scr$(y,x )=" ":IF key THEN moveyou
480 IF c$="^" THEN AT y-1,x-1:INK 2:PRINT "^":OVER 1:AT y-1,x-1:
    INK 6:PRINT"k":OVER 0
490 x=xx:y=yy
500 INK 4:AT y-1,x-1:PRINT "@"
510 AT MONb-1,MONA-1:PRINT " "
520 monstermovement
530 IF scr$(MONb,MONA)="^" THEN monsterdie
540 IF count=330 AND SHEET=2 THEN CLEARSHEET:SCREEN_INIT:GO TO 370
550 IF count=302 AND SHEET=3 THEN CLEARSHEET:SCREEN_INIT:GO TO 370
560 IF scr$(MONb,MONA)="." THEN count=count+1
570 INK 5:AT MONb-1,MONA-1:PRINT"%"
580 scr$(MONb,MONA)=" "
590 IF (x=MONA AND y=MONb) THEN EXIT main
600 update
610 NEXT loop
620 END REPeat main
630 FOR n=1 TO 50
640 BEEP n,n
650 INK n:AT y-1,x-1:PRINT"!"
660 NEXT n
670 lives=lives-1
680 AT y-1,x-1:PRINT" "
690 scr$(y,x)=" "
700 AT MONb-1,MONA-1:PRINT " "
710 IF lives>0 THEN GO TO 370
720 update:GAME_OVER
730 DEFine PROCedure monstermovement
740 IF MONA<x AND scr$(MONb,MONA+1)<>"*" THEN MONA=MONA+1:RETurn
750 IF MONA>x AND scr$(MONb,MONA-1)<>"*" THEN MONA=MONA-1:RETurn
760 IF MONb<y AND scr$(MONb+1,MONA)<>"*" THEN MONb=MONb+1:RETurn
770 IF MONb>y AND scr$(MONb-1,MONA)<>"*" THEN MONb=MONb-1:RETurn
780 END DEFine monstermovement
790 DEFine PROCedure moveyou
800 AT y-1,x-1 :PRINT " "
810 IF key=16 OR key=80 THEN moveright:IF BOMBS>0 AND key=80 THEN
    dropbomb
820 IF key=2 OR key=66 THEN moveleft:IF key=66 AND BOMBS>0 THEN
    dropbomb
830 IF key=4 OR key=68 THEN moveup:IF key=68 AND BOMBS>0 THEN
    dropbomb
840 IF key=128 OR key=192 THEN movedown:IF key=192 AND BOMBS>0
    THEN dropbomb
850 END DEFine moveyou
860 DEFine PROCedure moveright
870 IF x=36 THEN GO TO 900
880 c$=scr$(y,x+1)
890 IF c$<>"*" THEN xx=x+1
900 END DEFine moveright
910 DEFine PROCedure moveleft
920 c$=scr$(y,x-1)
930 IF c$<>"*" THEN xx=x-1
940 END DEFine moveleft
950 DEFine PROCedure moveup
960 c$=scr$(y-1,x)
970 IF c$<>"*" THEN yy=y-1
980 END DEFine moveup
990 DEFine PROCedure movedown
1000 c$=scr$(y+1,x)
1010 IF c$<>"*" THEN yy=y+1
```

```
1020 END DEFine movedown
1030 DEFine PROCedure dropbomb
1040 IF scr$(y,x)="." THEN count=count+1
1050 scr$(y,x)="^":AT y-1,x-1:INK 2:PRINT "^":OVER 1:INK 6:AT
     y-1,x-1:PRINT "&": OVER 0: BOMBS=BOMBS-1
1060 END DEFine dropbomb
1070 :
1080 DEFine PROCedure SCREEN_INIT
1090 sheets
1100 AT 8,12:PRINT "SCORE"
1110 AT 9,12:PRINT "LIVES"
1120 AT 10,12:PRINT "BOMBS"
1130 END DEFine SCREEN_INIT
1140 DEFine PROCedure sheets
1150 LOCal x,y
1160 DIM scr$(20,37)
1170 IF SHEET=1 THEN RESTORE 1340
1180 IF SHEET=2 THEN RESTORE 1550
1190 IF SHEET=3 THEN RESTORE 1760
1200 FOR y=1 TO 20
1210 READ scr$(y)
1220 NEXT y
1230 FOR y=1 TO 20
1240 FOR x=1 TO 37
1250 c$=scr$(y,x)
1260 IF c$="*" THEN INK 6:AT y-1,x-1:PRINT "*":NEXT x:NEXT y
1270 IF c$="." THEN INK 1:AT y-1,x-1:PRINT ".":NEXT x:NEXT y
1280 IF c$="[" THEN INK 4:OVER 1:AT y-1,x-1:PRINT "[":AT y-1,x-1:INK
     2:PRINT"]": OVER 0:NEXT x:NEXT y
1290 IF c$="+" THEN INK 2:OVER 1:AT y-1,x-1:PRINT "+":AT y-1,x-1:INK
     4:PRINT "-":OVER 0:NEXT x:NEXT y
1300 IF c$=" " THEN NEXT x:NEXT y
1310 NEXT x
1320 NEXT y
1330 END DEFine sheets
1340 DATA "*************************************"
1350 DATA "*                                   *"
1360 DATA "*   +  + +  + +  + ++++ ++++ +  + .  *"
1370 DATA "*   ++++ +  + ++ + +    +  + ++++   *"
1380 DATA "*   ++++ ++++ + ++ + ++ +++   ++    *"
1390 DATA "*   +  + ++++ +  + ++++ +  +  ++    *"
1400 DATA "*                                   *"
1410 DATA "*     [  [  [[  [[[[ [[[[ [  [      *"
1420 DATA "*     [[[[ [  [ [  [ [  [ [[[[       *"
1430 DATA "*     [[[[ [[[[ [[[  [[[   [[        *"
1440 DATA "*     [  [ [  [ [  [ [  [  [[        *"
1450 DATA "*                                   *"
1460 DATA "*************************************"
1470 DATA "*+                                 [*"
1480 DATA "*                                   *"
1490 DATA "*                                   *"
1500 DATA "*                                   *"
1510 DATA "*                                   *"
1520 DATA "*[                                 +*"
1530 DATA "*************************************"
1540 :
1550 DATA "*************************************"
1560 DATA "*+.............*.................+*"
1570 DATA "*.###############..###############.*"
1580 DATA "*...................................*"
1590 DATA "*.########..############..########.*"
1600 DATA "*...................................*"
1610 DATA "*.#######.................########.*"
1620 DATA "*.........###############...........*"
1630 DATA "*.#######.*               *.########.*"
1640 DATA "*.........*               *.........*"
1650 DATA "*.#######.*               *.########.*"
1660 DATA "*.........###############...........*"
1670 DATA "*.#######.................########.*"
1680 DATA "*...................................*"
1690 DATA "*.###############..###############.*"
1700 DATA "*...................................*"
1710 DATA "*.###############..###############.*"
1720 DATA "*...................................*"
1730 DATA "**[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[[**"
1740 DATA "*************************************"
1750 :
1760 DATA "***************       ***************"
1770 DATA "*[...........*       *...........[*"
1780 DATA "*.**.**.*.*.*.*       *.*.*.*.**.**.*"
1790 DATA "*....**...*.*.*********.*.*...**....*"
1800 DATA "*.**....*.................*....**.*"
1810 DATA "*.**.**.*.****.***.***.****.*.**.**.*"
1820 DATA "*...................................*"
1830 DATA "*********..***************..*********"
1840 DATA "         *..*               *..*"
1850 DATA "         *..*               *..*"
1860 DATA "         *..*               *..*"
1870 DATA "         *..***************..*"
1880 DATA "*********.....................*********"
1890 DATA "*.........***.***.***.***.........*"
1900 DATA "*.**....**.................**....**.*"
1910 DATA "*....**....**.....*.....**....**....*"
1920 DATA "*...........*********.............*"
1930 DATA "*.**.**.**.**.*       *.**.**.**.**.*"
1940 DATA "*[...........*       *...........[*"
1950 DATA "***************       ***************"
1960 DEFine PROCedure CLEARSHEET
1970 BEEP 0,288,2222,111,1,1
1980 PAUSE 50
1990 RECOL 7,1,5,3,4,0,6,2
2000 FOR n=1 TO 20
2010 SCROLL -10
2020 NEXT n
2030 BEEP
2040 SHEET=SHEET+1:IF SHEET=4 THEN SHEET=2
2045 BOMBS=5:count=0
2050 END DEFine CLEARSHEET
2060 DEFine PROCedure defchar
2070 set=167722
2080 old=PEEK_L (set)
2090 news=RESPR(875)
2100 FOR n=0 TO 875 STEP 4
2110 POKE_L news+n,PEEK_L (old+n)
2120 END FOR n
2130 POKE_L set,news
2140 RESTORE 2240
2150 numberofchars=12
```

```
2160 FOR char=1 TO numberofchars
2170 READ c$:c=CODE(c$)
2180 charpoke=news+10+(c-32)*9
2190 FOR dat=1 TO 9
2200 READ d:POKE charpoke+dat,d
2210 END FOR dat
2220 END FOR char
2230 END DEFine
2240 DATA "*",124,124,124,124,124,124,124,124,124
2250 DATA "@",68,56,84,124,84,108,124,40,108
2260 DATA "%",56,84,108,124,108,84,56,40,108
2270 DATA "[",4,8,16,16,40,36,32,0,0
2280 DATA "]",0,0,0,0,0,0,12,108,96
2290 DATA "+",0,0,0,124,124,124,56,56,16
2300 DATA "-",12,104,16,0,32,8,16,0,0
2310 DATA "!",68,56,84,124,108,84,124,40,108
2320 DATA "^",0,0,56,56,56,56,56,56,56
2330 DATA "&",24,16,0,56,0,0,0,56,0
2340 DATA ".",0,0,0,0,0,48,48,0,0,0
2350 DATA "\",0,40,68,104,16,44,100,68,0
2360 DEFine PROCedure GAME_OVER
2370 BEEP 0,343,900,64,9,1
2380 RECOL 4,1,2,3,6,5,7,0
2390 FOR n=1 TO 20
2400 SCROLL 10
2410 NEXT n
2420 BEEP
2430 BEEP 0,364,1000,20,2,2
2440 FOR n=99 TO 1 STEP -1.5
2450 BORDER n,n
2460 NEXT n
2470 BORDER 0,0
2480 IF score>HIGH THEN HIGH=score
2490 INK #0,6:AT #0,0,1:PRINT #0," GAME OVER "
2500 AT #0,1,2:PRINT #0," YOUR SCORE WAS "!score
2510 AT #0,2,3:PRINT #0," HIGH SCORE IS "!HIGH
2520 AT #0,3,4:PRINT #0," PRESS ENTER TO PLAY AGAIN "
2530 BEEP
2540 key=KEYROW(1):IF key<>1 THEN GO TO 2540:ELSE RECOL 0,0,0,0,0,
     0,0,0:RECOL #0 ,0,0,0,0,0,0,0,0:init
2550 END DEFine GAME_OVER
2560 DEFine PROCedure monsterdie
2570 FOR n=1 TO 7
2580 INK n:AT MONb-1,MONA-1:PRINT "\":BEEP 0,n,n,n,n
2590 NEXT n
2600 INK 0:AT MONb-1,MONA-1:PRINT " "
2610 BEEP
2620 scr$(MONb,MONA)=" "
2630 MONb=14:MONA=17
2640 score=score+100
2650 update
2660 END DEFine monsterdie
```



Space Indenter
B A W Harun

Not another 'Space Invaders', but another file listing utility similar to last month's ListO. We've included it to show two different solutions to the problem of making listings look more attractive and readable.

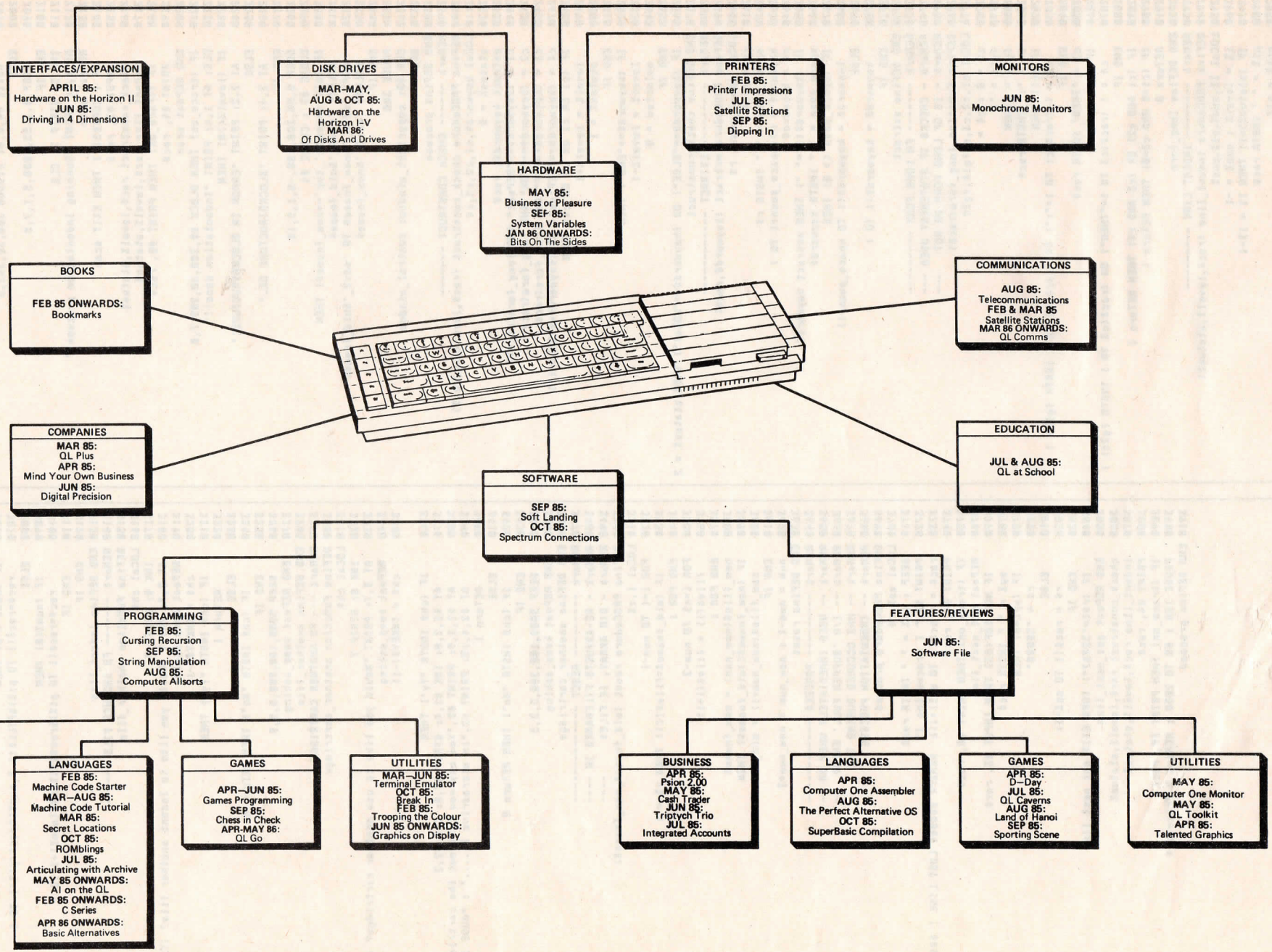
If any reader can come up with something which does the same task in 100 lines or less, we'd like to see it. ▶

PROGS

```
100 REMark ********************************
110 REMark ***   THE SPACE INDENTER!  ***
120 REMark *** (c) B.A.W. HARUN 1986  ***
130 REMark ***      VERSION 2.00        ***
140 REMark ********************************
150 :
160 REPeat main_control
170   initialise
180   REPeat indenter
190     inquire old_fname$,new_fname$,trace_on
200     process old_fname$,new_fname$,trace_on
210     IF NOT (another_file) THEN EXIT indenter
220     reset old_fname$,new_fname$
230   END REPeat indenter
240   IF NOT (another_cartridge) THEN EXIT main_control
250 END REPeat main_control
260 CLS #0 : STOP
270 :
280 REMark ---------- INITIALISE ---------
290 REMark -- GET DIR_TMP, RESET VARS   --
300 REMark -- GLOBAL :                  --
310 REMark -- file$     = DIR ARRAY     --
320 REMark -- num       = ARRAY SUBSCRIPT -
330 REMark -- new_file$= NEW FILES      --
340 REMark -- new_num   = NEW FILE SUBS --
350 REMark -- medium$   = MEDIUM NAME   --
360 REMark -- level%    = OF CONSTRUCT  --
370 REMark -- status%   = OF CONSTRUCT  --
380 REMark -- trace_on = VIEWING OF FILE -
390 REMark -- used%, left%, total%      --
400 DEFine PROCedure initialise
410 LOCal memory$,p1%,p2%
420   DIM file$(26,30): DIM new_file$(26,30)
430   num = 1 : new_num = 1
440   level% = 0 : status% = 0 : trace_on = 0
450   MODE 4 : WINDOW #0,512,256,0,0
460   PAPER #0,0: INK #0,7: BORDER #0,5,2: CLS #0
470   CSIZE #0,3,1: AT #0,1,3: PRINT #0, "T H E"
480   CSIZE #0,3,1: AT #0,3,7: PRINT #0, "S P A C E"
490   CSIZE #0,3,1 :AT #0,5,11: PRINT #0, "I N D E N T E R !"\\\
500   INK #0,4: CSIZE #0,1,0
510   PRINT #0,TO 10;"Please place the cartridge containing"\\
520   PRINT #0,TO 10;"your Superbasic files in Microdrive 2,"\\
530   PRINT #0,TO 10;"and then press any key to proceed!"\\\
540   INK #0,2: CSIZE #0,2,0: PRINT #0,TO 6;
      "Copyright B.A.W Harun 1986."
550   PAUSE : BEEP 0,50,150,1000,7,5,3,3
560   CURSOR #0,0,120 : CLS #0,2
570   INK #0,4: STRIP #0,2
580   AT #0,20,7: PRINT #0;" Accessing Microdrive 2... "
590   INK #0,0: STRIP #0,7
600   DELETE mdv2_dir_tmp
610   OPEN_NEW #3, mdv2_dir_tmp
620   DIR #3, mdv2_
630   CLOSE #3
640   OPEN_IN #3, mdv2_dir_tmp
650   INPUT #3, medium$, memory$
660   REPeat read_dir
670     IF EOF(#3) OR (num>26) THEN EXIT read_dir
680     INPUT #3, file$(num)
690     IF (file$(num)="dir_tmp") THEN num=num-1
700     num = num+1
710   END REPeat read_dir
720   CLOSE #3 : DELETE mdv2_dir_tmp
730   p1% = "/" INSTR memory$ : p2% = " " INSTR memory$
740   left% = memory$(1 TO p1%)*.5
750   total% = memory$(p1%+1 TO p2%)*.5
760   used% = (total%-left%)*.5
770   IF (num>26) THEN num = 26
780 END DEFine initialise
790 REMark ---------- INQUIRE ------------
800 DEFine PROCedure inquire (old_fname$,new_fname$,trace_on)
810 LOCal ch%,ch$,max%,esc_key,in_range
820   PAPER #0,7: CLS #0
830   copyright_window
840   control_window
850   display_dir file$,num
860   BEEP : trace_on = 0
870   REPeat questions
880   AT 12,0: CLS 2: INK 7: STRIP 2
890   PRINT TO 7,"Please press appropriate letter for file selection
900   PRINT "Select between the letter A to Z; max of 26 Superbasic
      files shown"
910   REPeat ask_old_fname
920       ch% = CODE(INKEY$(-1))
930       max% = num+63
940       in_range = (ch%)=65 AND ch%(=max%) OR (ch%)=97 AND
        ch%(=max%+32)
950       IF (ch%)=97) THEN ch% = ch%-32
960       IF (in_range) THEN
970         old_fname$ = file$(ch%-64)
980         EXIT ask_old_fname
990       END IF
1000      BEEP 5000,100,200,500,3
1010    END REPeat ask_old_fname
1020    REPeat ask_new_fname
1030      AT 12,0: CLS 2
1040      PRINT " Please input new filename...press ENTER to
        overwrite file."
1050      INPUT "> "¡new_fname$
1060      IF (new_fname$="") THEN
1070        new_fname$ = old_fname$&'_tmp'
1080        EXIT ask_new_fname
1090      END IF
1100      IF (verified(new_fname$,old_fname$)) THEN EXIT
        ask_new_fname
1110      BEEP 5000,100,200,1500,5
1120    END REPeat ask_new_fname
1130    AT 12,0: CLS 2
1140    PRINT TO 2," Would you like to view the resultant indented
        file? (Y/N)"
1150    REPeat ask_tracking
1160      ch$ = INKEY$(-1)
1170      IF (ch$ INSTR "Yy") THEN
1180        trace_on = 1
1190        EXIT ask_tracking
1200      ELSE
1210        IF (ch$ INSTR "Nn") THEN EXIT ask_tracking
1220      END IF
1230      BEEP 5000,100,200,5000,3
1240    END REPeat ask_tracking
1250    AT 12,0: CLS 2
1260    PRINT TO 11,"Press ENTER if Ok, or ESC to start again! "
1270    REPeat ask_satisfied
1280      ch% = CODE(INKEY$(-1))
1290      esc_key = (ch%=27)
1300      IF (esc_key) OR (ch%=10) THEN EXIT ask_satisfied
1310      BEEP 5000,100,200,500,7
1320    END REPeat ask_satisfied
1330    IF (ch%=10) THEN EXIT questions
1340    BEEP 10000,5,25,1000,6
1350  END REPeat questions
1360 END DEFine inquire
1370 REMark ----- COPYRIGHT WINDOW -------
1380 DEFine PROCedure copyright_window
1390   BLOCK #0,310,60,60,20,0
1400   WINDOW #2,310,60,80,20
1410   PAPER #2,2: INK #2,7: CLS #2: CSIZE #2,1,0
1420   PRINT #2,TO 10;"The Space Indenter!"
1430   CSIZE #2,0,0: PRINT #2,TO 20;"©  B.A.W HARUN"
1440   PRINT #2,FILL$("-",51)
1450   INK #2,0: PRINT #2,TO 8;"Please do not remove the cartridge"
1460   PRINT #2,TO 14;"which is in Microdrive 2"
1470 END DEFine copyright_window
1480 REMark ----- CONTROL WINDOW ---------
1490 DEFine PROCedure control_window
1500   BLOCK #0,400,140,30,102,0
1510   WINDOW #00,140,50,100
1520   PAPER 4: INK 0: CLS
1530 END DEFine control_window
1540 REMark ----- DISPLAY DIRECTORY ------
1550 REMark - ONLY DISPLAYS '_BAS' FILES -
1560 REMark - OR FILES WITH NO EXTENSION -
1570 DEFine PROCedure display_dir(file$,num)
1580 LOCal i,ext$,ext%,sbasic
1590   PRINT TO 3;"Directory of '"¡medium$¡"' ";
1600   PRINT "= Used :"¡used%¡"K  Left :"¡left%¡"K  Total
        :"¡total%¡"K"
1610   PRINT FILL$("-",66)
1620   FOR i=1 TO num-1
1630     ext% = LEN(file$(i))
1640     IF (ext%>3) THEN
1650       ext$ = file$(i)(ext%-3 TO )
1660     ELSE
1670       ext$ = file$(i)
1680     END IF
1690     sbasic = ("_bas" INSTR ext$) OR ("_" INSTR ext$=0 )
1700     IF (sbasic) THEN
1710       PRINT !!!!!!CHR$(i+64)!!file$(i)(1 TO 15);
1720     END IF
1730   END FOR i
1740   AT 11,0: PRINT FILL$("_",66)
1750 END DEFine display_dir
1760 REMark ------- FN VERIFIED ----------
1770 REMark - CHECKS IF NEW FILENAME CAN -
1780 REMark - BE USED AND IS VALID       -
1790 DEFine FuNction verified(new_fname$,old_fname$)
1800 LOCal i,c1,c2,c3
1810   c1 = (new_fname$(1)("A" OR new_fname$(1))"Z")
1820   c2 = (new_fname$(1)("a" OR new_fname$(1))"z")
1830   IF (c1 AND c2) THEN RETurn 0
1840   IF (new_fname$==old_fname$) THEN
1850     new_fname$ = old_fname$&'_tmp'
1860     RETurn 1
1870   END IF
1880   FOR i=1 TO num
1890     c3 = (new_fname$==file$(i)) OR (new_fname$==new_file$(i))
1900     IF (c3) THEN RETurn 0
1910   END FOR i
1920   RETurn 1
1930 END DEFine verified
1940 REMark --------- PROCESS ------------
1950 REMark - OPEN & READS EACH RECORD, --
1960 REMark - CHECK ITS CONSTRUCT,      --
1970 REMark - INDENTS THE RECORD        --
1980 REMark - ACCORDINGLY AND WRITES IT --
1990 REMark - OUT IMMEDIATELY, CLOSING  --
2000 REMark - & TIDYING UP AT THE END   --
```

```
2010 DEFine PROCedure process(old_fname$,new_fname$,trace_on)
2020 LOCal rec$
2030   OPEN_IN #3, 'mdv2_'&old_fname$
2040   OPEN_NEW #4, 'mdv2_'&new_fname$
2050   IF (trace_on) THEN
2060     CLS #0: BLOCK #0,200,30,285,7,0
2070     CSIZE #0,0,0: WINDOW 200,30,382,5
2080   ELSE
2090     BEEP 0,3,55,3000,5,1,7,5
2100   END IF
2110   INK 2: STRIP 7: CLS
2120   AT 1,2: PRINT "Running Indentation process!"
2130   REPeat scan
2140     IF ( EOF(#3) ) THEN EXIT scan
2150     INPUT #3, rec$
2160     check_construct rec$,level%,status%
2170     indent_line rec$,level%,status%
2180     IF (trace_on) THEN PRINT #0, rec$
2190     PRINT #4, rec$
2200   END REPeat scan
2210   IF (trace_on) THEN BLOCK #0,200,30,285,7,0
2220   CLS: AT 1,4: PRINT "Indentation done!!"
2230   IF (level%<>0) THEN
2240     AT 2,2: PRINT "ERROR IN BLOCKSTRUCTURE!"
2250   ELSE
2260     AT 2,4: PRINT "BLOCKSTRUCTURE OK."
2270   END IF
2280   BEEP 0,80,200,100,-5,1,5,10
2290   CLOSE #3 : CLOSE #4
2300   IF (old_fname$&'_tmp'==new_fname$) THEN
2310     DELETE 'mdv2_'&old_fname$
2320     COPY 'mdv2_'&new_fname$ TO 'mdv2_'&old_fname$
2330     DELETE 'mdv2_'&new_fname$
2340   END IF
2350   PAUSE 300
2360   CLS #0: copyright_window: control_window
2370   BEEP
2380 END DEFine process
2390 REMark ------ CHECK CONSTRUCT -------
2400 DEFine PROCedure check_construct (rec$,level%,status%)
2410 LOCal keyword$,c1,c2,c3,c4
2420   status% = 0
2430   extract keyword$, rec$
2440   c1 = (keyword$=="REPeat" AND long_form(rec$))
2450   c2 = (keyword$=="FOR" AND long_form(rec$))
2460   c3 = (keyword$=="IF" AND long_form(rec$))
2470   c4 = (keyword$=="DEFine") OR (keyword$=="SELect")
2480   IF (c1 OR c2 OR c3 OR c4) THEN
2490     level% = level%+1
2500     status% = 1
2510   END IF
2520   IF (keyword$=="END") THEN
2530     level% = level%-1
2540     selected = 0
2550   END IF
2560   IF (keyword$=="ELSE") OR (keyword$=="LOCal") THEN status% = 2
2570 END DEFine check_construct
2580 REMark --------- EXTRACT ------------
2590 DEFine PROCedure extract (keyword$,rec$)
2600 LOCal space_posn, r$
2610   r$ = rec$
2620   space_posn = " " INSTR r$
2630   keyword$ = r$(space_posn+1 TO )
2640   r$ = keyword$
2650   IF (keyword$(1)=" ") THEN extract keyword$, r$
2660   space_posn = " " INSTR keyword$
2670   IF (space_posn <> 0) THEN
2680     keyword$ = keyword$(1 TO space_posn-1)
2690   ELSE
2700     keyword$ = keyword$(1 TO )
2710   END IF
2720 END DEFine extract
2730 REMark ------- FN LONG FORM ---------
2740 REMark - CHECKS IF STATEMENT USED ---
2750 REMark - IS OF LONG FORM OR NOT   ---
2760 DEFine FuNction long_form(rec$)
2770 LOCal c1,c2,c3,c4fg1$,fg2$
2780   c2 = 0 : c4 = 0
2790   fg1$ = ":
2800   fg2$ = "THEN
2810   c1 = ":" INSTR rec$
2820   IF (c1) THEN
2830     c2 = ( (rec$(c1 TO )=":") OR (rec$(c1 TO ) INSTR fg1$) )
2840   END IF
2850   c3 = "THEN" INSTR rec$
2860   IF (c3) THEN
2870     c4 = ( (rec$(c3 TO )="THEN") OR (rec$(c3 TO ) INSTR fg2$) )
2880   END IF
2890   IF (c1 AND c2) OR (c3 AND c4) THEN RETurn 1
2900   IF (c1=0 AND c3=0) THEN RETurn 1
2910   RETurn 0
2920 END DEFine long_form
2930 REMark -------- INDENT LINE ---------
2940 DEFine PROCedure indent_line (rec$,level%,status%)
2950 LOCal l%,num%,p1%,pos%
2960   l% = level% : num% = -1
2970   IF (status%)=1) THEN l% = l%-1
2980   p1% = " " INSTR rec$
2990   pos% = p1%
3000   REPeat check
3010     IF ( rec$(pos%)<>" " ) THEN EXIT check
3020     pos% = pos%+1
3030     num% = num%+1 : REMark * num of spaces-1 *
3040   END REPeat check
3050   num% = (l% * 2)-num%
3060   IF (num% > 0) THEN
3070     rec$=rec$(1 TO p1%)&FILL$(" ",num%)&rec$(p1%+1 TO )
3080   ELSE
3090     IF (num%<0) THEN
3100       rec$=rec$(1 TO p1%)&rec$(p1%+ABS(num%)+1 TO )
3110     END IF
3120   END IF
3130 END DEFine indent_line
3140 REMark ------- FN ANOTHER FILE ------
3150 DEFine FuNction another_file
3160 LOCal ch$
3170   INK 0: STRIP 7
3180   AT 5,7: PRINT "Would you like to Indent another file? (Y/N)"
3190   REPeat keep_asking
3200     ch$ = INKEY$(-1)
3210     IF (ch$ INSTR "Yy") THEN
3220       RETurn 1
3230     ELSE
3240       IF (ch$ INSTR "Nn") THEN RETurn 0
3250     END IF
3260     BEEP 5000,100,200,5,5,5
3270   END REPeat keep_asking
3280 END DEFine another_file
3290 REMark --- FN ANOTHER CARTRIDGE -----
3300 DEFine FuNction another_cartridge
3310 LOCal ch$
3320   INK 0: STRIP 7
3330   AT 5,7: PRINT "Would you like to use another cartridge? (Y/N)"
3340   REPeat keep_asking
3350     ch$ = INKEY$(-1)

3360     IF (ch$ INSTR "Yy") THEN
3370       AT #2,2,0: INK #2,4: STRIP #2,0: CLS #2,2
3380       AT #2,3,9: PRINT #2,"You may now take out the cartridge"
3390       AT #2,4,15: PRINT #2,"in microdrive 2....." : PAUSE 300
3400       RETurn 1
3410     ELSE
3420       IF (ch$ INSTR "Nn") THEN RETurn 0
3430     END IF
3440     BEEP 5000,100,200,5,5,5
3450   END REPeat keep_asking
3460 END DEFine another_cartridge
3470 REMark --------- RESET --------------
3480 REMark - RE-ADJUSTS FILENAMES IN ----
3490 REMark - DIR ARRAY, IE FILE$     ----
3500 DEFine PROCedure reset (old_fname$,new_fname$)
3510 LOCal i,x%
3520   FOR i=1 TO num-1
3530     IF (old_fname$=file$(i)) THEN x% = i
3540   END FOR i
3550   FOR i=x% TO num-2
3560     file$(i) = file$(i+1)
3570   END FOR i
3580   new_file$(new_num) = new_fname$
3590   IF (new_fname$<>old_fname$) THEN
3600     new_file$(new_num+1) = old_fname$
3610   END IF
3620   num = num-1 : new_num = new_num+2
3630 END DEFine reset
3640 REMark --------- PROCEED ------------
3650 REMark -- USED IMMEDIATELY WHEN AN --
3660 REMark -- I/O 'BUFFER FULL' ERROR  --
3670 REMark -- HAS OCCURED DURING THE   --
3680 REMark -- INDENTATION PROCESS      --
3690 DEFine PROCedure proceed
3700 LOCal sp%,r$
3710   BEEP : sp% = " " INSTR rec$
3720   PRINT #0," [ Proceeding ]"
3730   rec$ = (rec$(1 TO sp%)+1)&' REMark ###### LOST LINE ! ######'
3740   PRINT #4, rec$
3750   IF (trace_on) THEN PRINT #0, rec$
3760   REPeat get_next_line
3770     IF NOT EOF(#3) THEN INPUT #3, rec$
3780     sp% = " " INSTR rec$
3790     IF (sp%=0) THEN
3800       r$ = "50000"
3810     ELSE
3820       r$ = rec$(1 TO sp%-1)
3830     END IF
3840     IF (r$<="32767") THEN EXIT get_next_line
3850   END REPeat get_next_line
3860   check_construct rec$,level%,status%
3870   indent_line rec$,level%,status%
3880   PRINT #4, rec$
3890   IF (trace_on) THEN PRINT #0, rec$
3900   PAUSE 100 : GO TO 2050 : REMark * Process *
3910 END DEFine proceed
```



Where to go from here — for the benefit of *QL World* readers who missed our index chart in the *QL User* Owner's Manual, an updated guide to articles and information on virtually every aspect of the QL contained in previous editions of *QL User*.

QL COMMUNICATIONS

QCODE TERMINAL software £19.95

Features:

VIEWDATA TERMINAL – for PRESTEL and MICRONET

* Split baud rate operation (75tx/1200rx) in conjunction with MODAPTOR (see below) – necessary for calling PRESTEL.
* Can handle dynamic frames.
* Full emulation of colours, mosaics, separated mosaics, etc.
* Save displayed page to file on microdrive or disk.
* Save entire session to file on microdrive or disk.
* Replay, create or edit saved pages whilst off-line.
* Transmit a saved file.

PLUS

VT52 (Scrolling terminal) – for use with Bulletin boards, electronic mail services, mainframe computers, etc.

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* VT52 control codes, for fancy editors, etc.
* Additional control codes to set display colours.
* Alternate keypad emulation.
* Upload or download text files using standard utilities on host.
* XON-XOFF protocol.

PLUS

* QL to QL file transfer. Any file transferred from disk or microdrive, including executable files, Quill documents, etc.
* Error detecting and correcting protocol.

QL MODAPTOR £39.00

* Links QL to 300/300, 1200/75, 1200/1200 modem. eg WS2000, PRISM 1000 & 2000, NIGHTINGALE, DATACHAT, VOYAGER 11.
* Includes QCODE TERMINAL software.
* State modem type when ordering if not 25 way connector.

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★ 3 metre cable

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★ Lets Atari/Commodore/Spectrum joysticks plug into CTL ports

QL SCREEN DUMP £4.99

★ Copies whole or part of screen to Epson compatible printer

QL MODAPTOR £39.00

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★ 256K RAM with through connector for DISK I/F

QL EXPANDERAM 512 ..... £125.00

★ 512K RAM with through connector for DISK I/F

QL RAMDISC SOFTWARE £14.95

★ Configures RAM as disk lookalike
★ Ideally suited to **MS EXPANDERAM**
★ Enables Microdrive software to run much faster with less wear on microdrives
★ Fully compatible with Psion packages, SuperBasic etc.

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FOR THE QL:-

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Quality software by Tony Tebby, Quality product by Care Electronics

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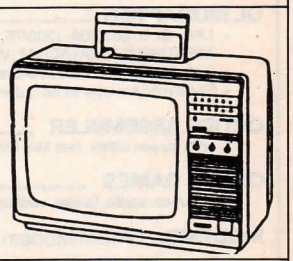

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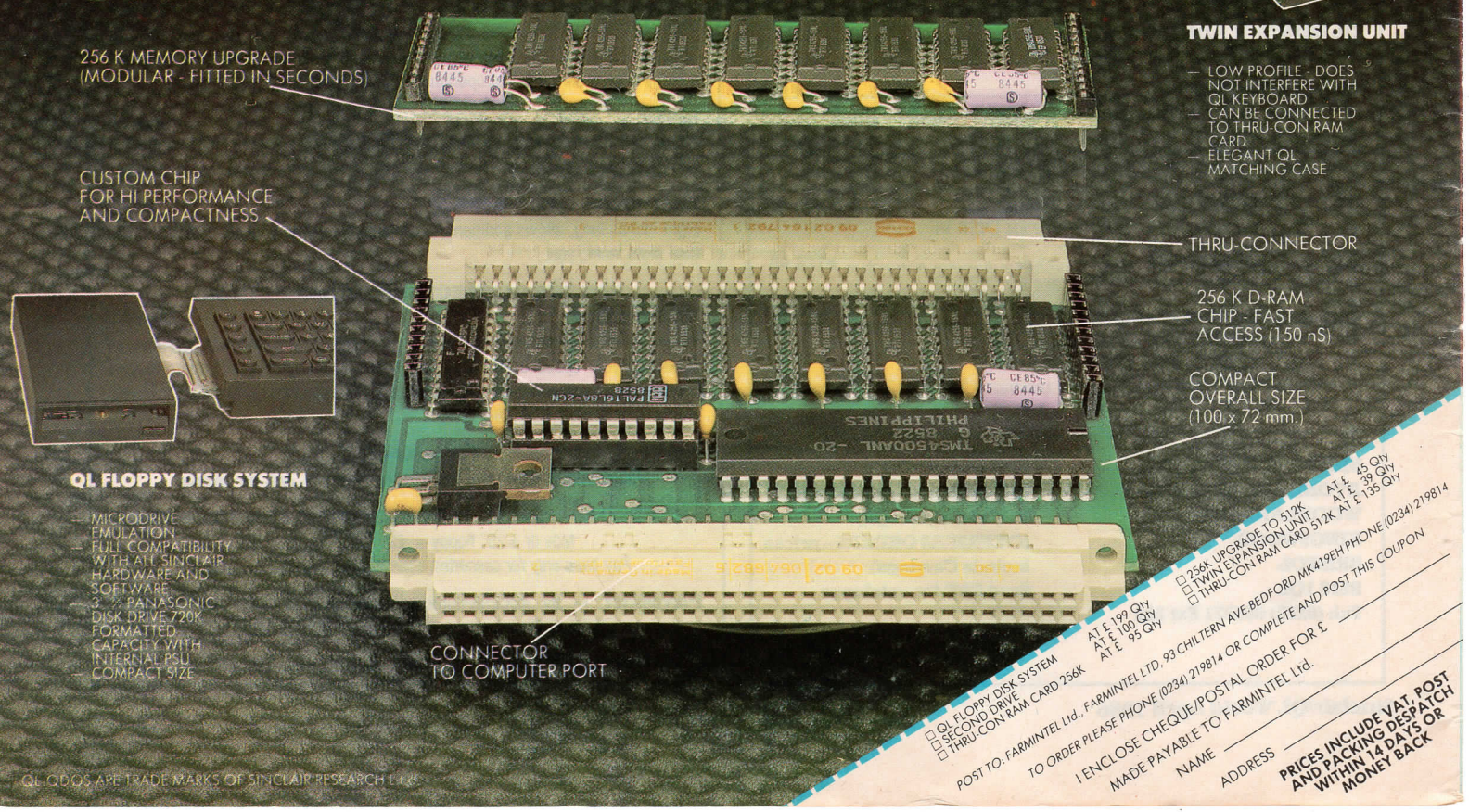

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It must be stressed that we are not selling the software itself, nor providing any guarantee that it performs any particular function (though we do check every program that is to appear in *Sinclair QL World*), we are merely offering a service to readers who wish to obtain *Sinclair QL World/QL User* programs on drive rather than by typing them in straight from the page.

HOW TO ORDER

Listed below are programs which have appeared as listings inside *QL World/QL User* and *Sinclair QL World.*

To the right of each program entry is a small box, which you should mark with a bold cross if you want to order that program.

Once you have put a cross next to all the programs you wish to have copied onto microdrive, simply complete the rest of the order form and send it along with your PO/cheque AND BLANK FORMATTED DRIVE to:

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If you wish us to supply the drive, please add an extra £2.50 for every drive required and mark the order form appropriately.

Please allow 28 days for delivery.

ORDER FORM

Author	Language	Program Name	Price	Issue	Size
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Richard Cross	(AO)	Mini Monitor	£3.00	Oct	60 ☐
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A Didcock	(B)	Connect4	£1.00	Sept	15 ☐
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Williams & Holliday	(AO)	Paladin	£5.00	Apr	70 ☐
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Richard Cross	(MB)	Sprite Animation	£2.00	Apr	50 ☐
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Steve Deary	(B)	Pacman	£1.00	Mar	20 ☐
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B = SuperBasic, AO = Assembler + Object Code (ready to run), MB = Machine Code + Basic loader

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No of programs ordered ..... Total cost £.....

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Plus postage & packing £ 0.75

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TOTAL TO BE SENT £.....

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- ★ Twelve times faster than other RAM disks **QL** screen image (32768 bytes) loads in 0.119 seconds!
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